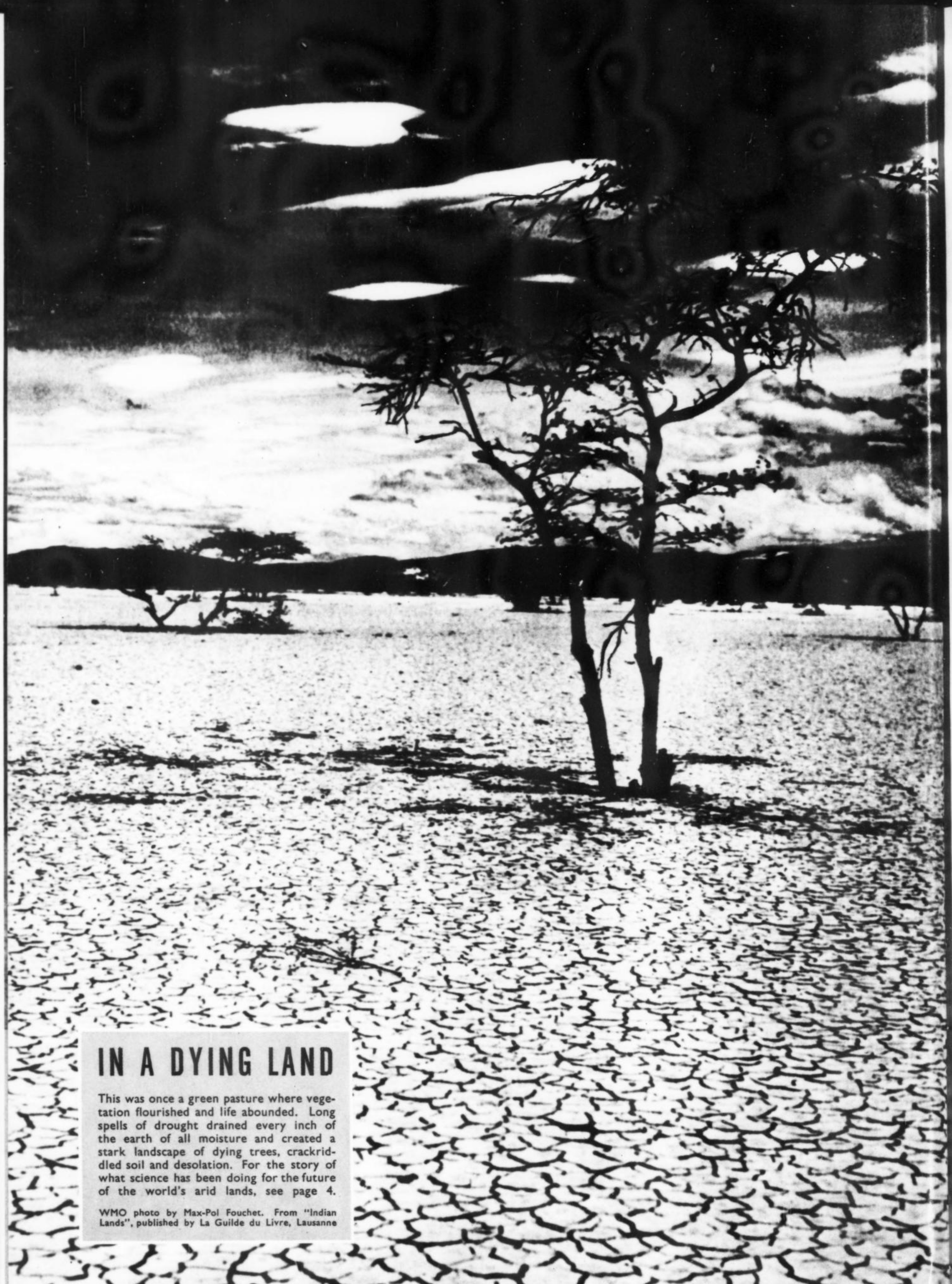
A WINDOW OPEN ON THE WORLD

The UNESCO Courier

MAY 1962 (15TH YEAR) PRICE: 50 CENTS (U.S.)

THIRSTY LANDS PAST & FUTURE



IN A DYING LAND

This was once a green pasture where vegetation flourished and life abounded. Long spells of drought drained every inch of the earth of all moisture and created a stark landscape of dying trees, crackriddled soil and desolation. For the story of what science has been doing for the future of the world's arid lands, see page 4.

WMO photo by Max-Pol Fouchet. From "Indian Lands", published by La Guilde du Livre, Lausanne

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No. 5

PUBLISHED IN EIGHT EDITIONS

English
French
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Russian
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Arabic
U.S.A.
Japanese

COVER PHOTO

This rock painting at Tassili, on the eastern borders of the Sahara Desert 1,000 miles south of Tunis, is 5,500 years old. Along with many other recently discovered traces of an ancient human occupation, it reveals the fact that this now utterly arid region was once a green and fertile place. (See page 16).
© J. D. Lajoux

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(M. C. 62.1. 169 A)

Published monthly by
The United Nations Educational, Scientific and Cultural Organization
Editorial Offices
Unesco, Place de Fontenoy, Paris 7e, France
Editor-in-Chief
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Assistant Editor
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English Edition : Ronald Fenton
French Edition : Jane Albert Hesse
Spanish Edition : Arturo Despouey
Russian Edition : Veniamin Matchavariani (Moscow)
German Edition : Hans Rieben (Berne)
Arabic Edition : Abdel Moneim El Sawi (Cairo)
Japanese Edition : Shin-Ichi Hasegawa (Tokyo)
Layout & Design
Robert Jacquemin

THE UNESCO COURIER is published monthly, except in July and August when it is bi-monthly (11 issues a year), in English, French, Spanish, Russian, German, Arabic and Japanese. Sales and distribution: UNESCO Publications Center. U.S.A. 801 Third Avenue, New York 22, N.Y., Plaza 1-3860 (sole distributors of the U.S.A. edition). Second-class mail privileges authorized at New York, N.Y.

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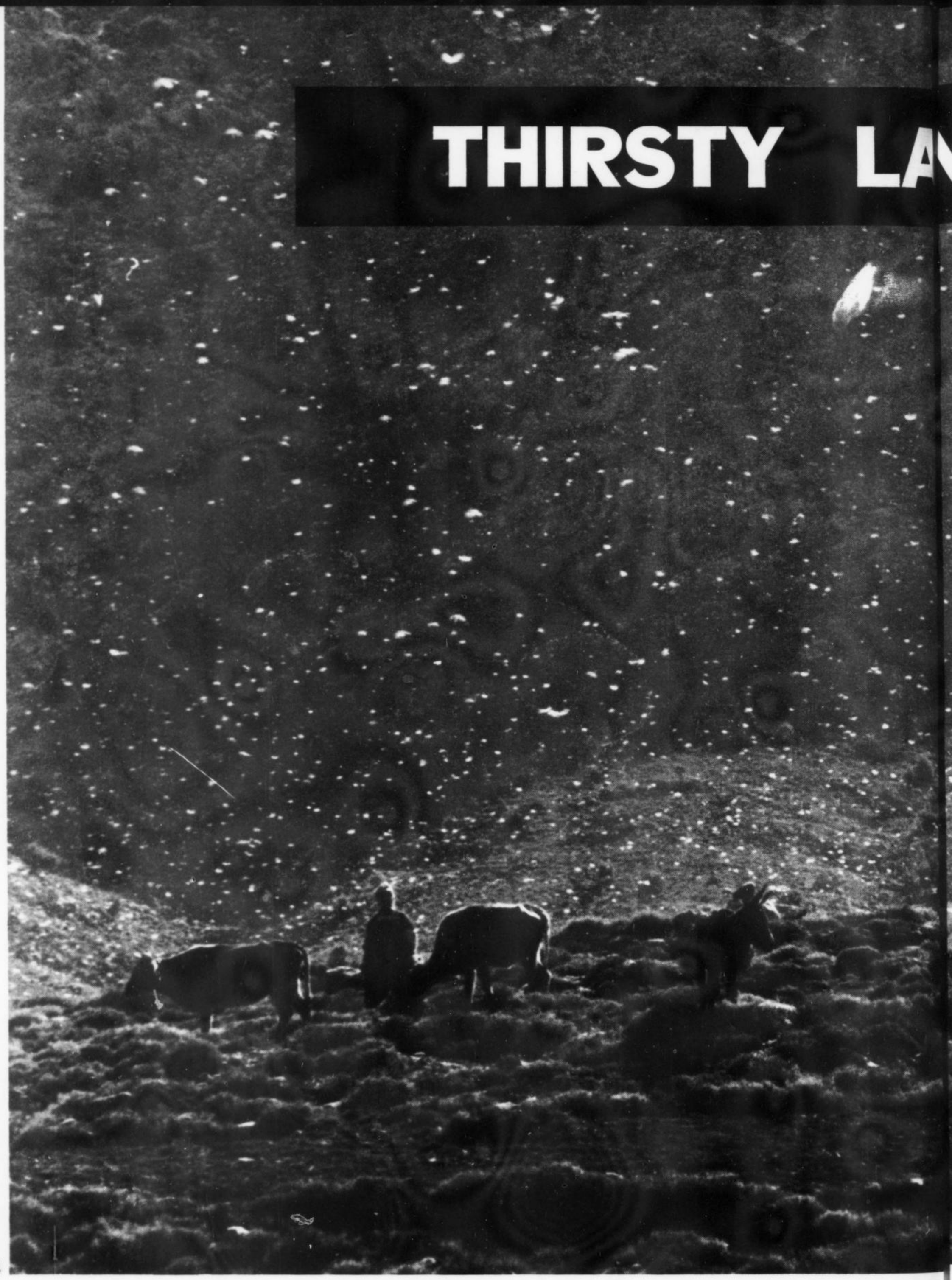
The Unesco Courier is indexed monthly in The Readers' Guide to Periodical Literature.

Annual subscription (any edition): $ 5.00 ; Single copies : 50 cents.

All correspondence should be addressed to the Editor-in-Chief in Paris.



WINGED PLAGUE

Like huge snowflakes falling grotesquely onto the parched summer landscape of Morocco, a cloud of locusts swoops down on the sparse vegetation. In the arid lands movements of this nomad scourge of the insect world often correspond to the appearance of vegetation after seasonal or sporadic rains.

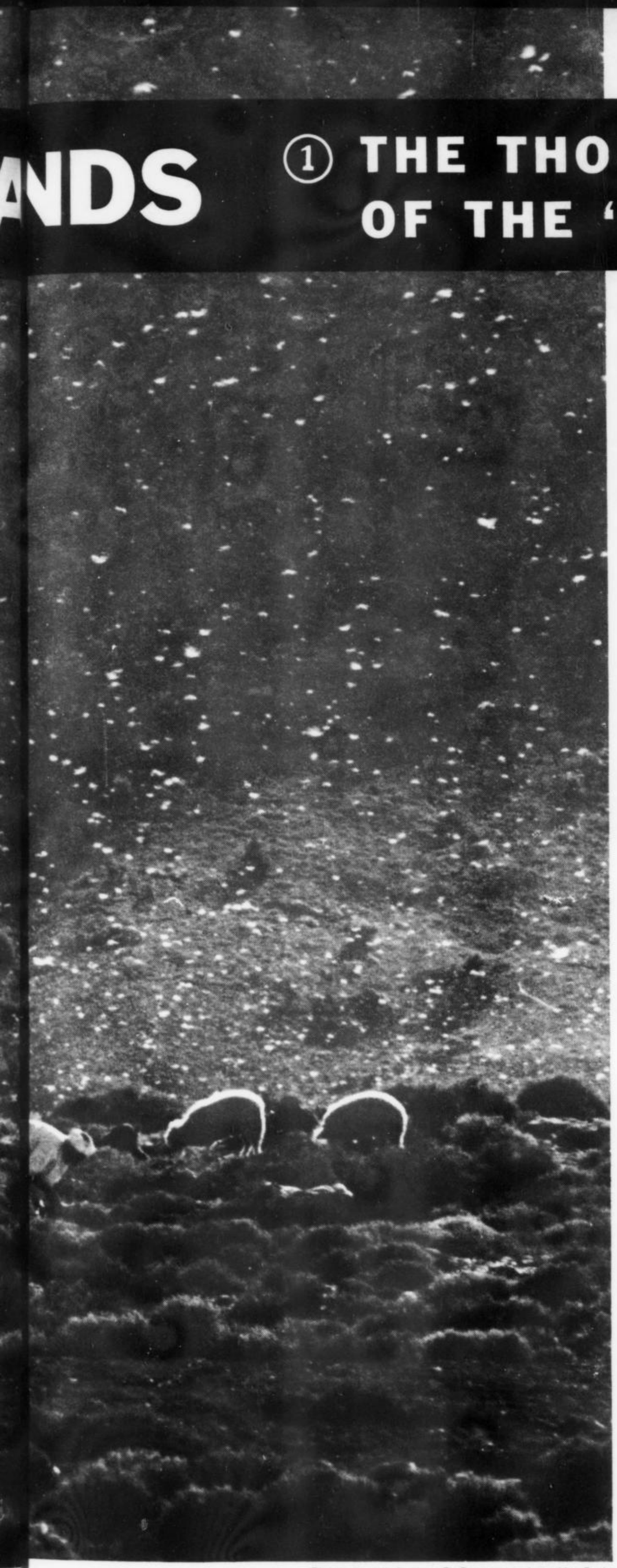


Photo André Sonine © Reporters Associés, Paris

ANDS ① THE THOUSAND FACES OF THE 'DESERT'

Unesco's Major Project to promote scientific research on the world's vast arid lands is to be brought to an end this year after six years of operation. This period has seen the amazing growth of national and international activities for the development of arid lands in which the training of new arid land scientists and basic research have received a new impetus. The end of Unesco's Major Project will not mean the end of this work. On the contrary, it will now be carried forward as part of Unesco's regular programme and on an even wider scale than before by direct action made possible through the Technical Assistance programme and the United Nations Special Fund. In a recent Unesco booklet, Professor Gilbert F. White, head of the Department of Geography of the University of Chicago, has reviewed the situation of *Science and the Future of Arid Lands*, which we strongly recommend to our readers. (Limited supply available on request). From this authoritative study the Special Report on the following pages has been adapted.

ARID and semi-arid regions cover more than a third of the land surface of the earth, while cultivated ground represents barely a tenth. For each acre of cultivated land, there are three or four acres which are practically unused by man because they are desert or covered with sparse vegetation permitting only a precarious subsistence economy at best. Yet the world's population, which now exceeds 2,700 millions is increasing more and more rapidly, and at the present rate will double itself in fifty years.

These regions cover an immense diversity of landscapes: majestic expanses of rolling steppe land in central Asia and North Africa; dry lake bottoms in central Australia; rugged mountain valleys in Baluchistan; nearly flat deltas at the mouths of the Nile and the Colorado.

Archæological evidence suggests that the earliest cities were in the dry valley of Mesopotamia. Possibly the earliest cultivators and herdsmen were on the dry uplands or river fringes of south-west Asia. Whatever the precise early chronology, the arid zone has been occupied by man since civilization emerged on the earth and it now shows both rich fruit from his evolving use of its limited resources and deep scars from his protracted misuse.

In these sectors of the earth's crust men often scan the skies for a sign of rain, for scanty rainfall is the common theme and the common problem. Rain is measured in the depth that falls in an hour or day or year, and often is expressed as a mean annual depth in millimetres.

Any land surface in the temperate latitudes with a mean annual precipitation of less than 250 millimetres is

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Photos Unesco - J. Dominique Lajoux

THIRSTY LANDS *(Cont'd)*

Overnight magic in the wilderness

likely to suffer from shortage of moisture for crop growth, but gross annual amounts are misleading if taken alone, and they must be compared with the amounts of moisture that would be used through evaporation or transpiration by plants if a true measure of the adequacy of water supply for plant growth is to be obtained. While a place such as Tartous, in Syria, may have a surplus of moisture in a few winter months, it may have a shortage throughout the remainder of the year.

The term "desert" is used very loosely by both scientists and popular writers. The western interior of the United States of America was dubbed "desert" by the pioneers but would be considered humid by a Libyan herdsman on the edge of the Sahara.

In the lands where summer daytime temperatures commonly are high, vegetation, soil and ground water also are sparse. Except for generally narrow strings of tamarix, cottonwoods or similar trees along water courses there are no dense stands of trees, and over large expanses the herbaceous and shrubby plants are so thin as to support only a few goats or a camel on 100 hectares annually. In a few places there are major accumulations of fresh ground water but generally these are meagre, in many instances floating upon waters that are so saline as to be unpalatable for animals and toxic for plants.

But if the water, soil and vegetation are marked by sparsity they are also marked by variability both in time and in place. It is not uncommon for a station in the Nubian Desert or Negev to go 11 months without a drop of rain and then to have a cloudburst of twenty inches in a few hours.

Vegetation knows no orderly time-table here, but responds in striking fashion to the vagaries of rain. This is epitomized by the bright, delicate carpet of desert flowers that may spring overnight from a seared desert soil following one of the infrequent rains. Much of the movement of nomads and of the nomad scourge of the insect world—the locust—is in response to vegetation which flourishes for a time in the wake of seasonal or sporadic rains.

Just as arid lands vary with the years and seasons, they vary tremendously from place to place. The unbroken vista of sand dunes with uniform ridges, soil, vegetation and water conditions—the traditional *erg* of the Sahara—is in fact relatively rare.

A vast expanse of gently sloping plains in the western Egyptian arid zone gives at first glance a deceptive impression of uniformity. On closer examination it is found to have a complex set of soils and plants. The spottiness becomes greater to the east when areas with greater differences in rock formation and relief are investigated, as with the wadi systems that drain the Sinai Peninsula and embrace a wide variety of land forms and plant communities.

Tenacious human beings have established pockets of settlement in these lands, leaving vast areas unoccupied. From the standpoint of human occupation, scarcity, variability and spottiness again are prominent characteristics. Arid lands encompass several of the great uninhabited wastes of the world—the Sahara *ergs*, the Atacama desert of the Chile coast, the Salt Desert of Iran, and the Takla Makan of Central Asia.

SUNKEN OASIS. A few years ago an oasis cast its green shade near Fort Flatters in the Sahara. Today it has been swallowed up by the creeping sands and only the tops of three palm trees (left) mark its grave. Nearby is a lunar-like landscape (above) created by strange formations of vegetal origin which formerly clung to the roots of trees, now dead and today petrified by time and weather.

These typically are crossed by caravan tracks and air routes which connect settlements within and on their borders. There and on the semi-arid borders are four major classes of settlement. Perhaps most characteristic are the pastoral nomadic groups which range across and in the arid areas of the Old World in search of grass and water but whose fortunes always are linked by trade or tribute with sedentary areas.

Intensive farming is the rule in the Nile, Tigris-Euphrates, Indus, Amu-Darya and Colorado valleys, as well as in isolated areas like the Ouargla Oasis in Algeria or the Imperial Valley of California and Fayum Depression of Egypt, and it is in these areas that the greater number of the people of the arid lands is crowded.

In some places linked with these agricultural areas and in other places quite independent of them are fast mushrooming cities like Cairo which have long been capitals and in many instances owe their existence to religious, mining, government, or trade functions which are largely independent of the agricultural hinterland.

Thus Mecca and Jerusalem are holy cities, Karachi and Teheran have taken on importance as centres of new political administration, Kuwait and Abadan are centres for oil exploitation. Quetta and San Diego are military bases, and Phoenix and Yuma serve a relatively recent invasion of urban dwellers who seek to enjoy the amenities of sunshine and dry warmth.

In addition to the nomads, oasis farmers and city dwellers, all of the arid lands have twilight margins of semi-arid lands that are occupied in varying degrees by sedentary farmers who try to wrest a living out of the dry soil in the face of rains sometimes niggardly and sometimes copious, and whose fortunes are at times as variable as the rains. These marginal lands occasionally have been the theatre of large-scale government occupation, as in the case of the "virgin lands" programme in the arid southern fringes of the Union of Soviet Socialist Republics.

In the Americas and Australia the arid lands have been largely free of pastoral nomadic occupancy although their irrigated settlement has been one of the early human chapters, and recently their use has turned on new forms of urban and mining exploitation of climate and location. Swimming pools ripple in the outskirts of Los Angeles on land that once was worthless for forage.

It is highly problematical as to how most of the arid landscape appeared when the earliest agricultural settlements were established. Certainly the plant cover has been changed radically since that time: Syrian mountain slopes have been largely denuded of trees, and grasslands have changed dramatically in plant composition.

The records of abandoned fields and civilizations, coupled with these instances of landscape change, have fostered a popular belief that deserts around the world are advancing. Sometimes these advances are attributed to human destruction of resources, and sometimes to climatic change.

The chronology is still confused and indistinct in many periods, but from the patchy data a few conclusions begin to emerge:

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30 centuries of man-made destruction

1) With the polar recession of the last of the great fluctuating ice sheets aridity was widespread in the desert lands of south west Asia and Africa. There were marked changes in temperature and precipitation during the long glacial period, so that lakes filled in areas of both Asia and America which are now dry, but by the end of the period, perhaps 15,000 years ago, a general climatic situation similar to the present had set in.

2) The prevailing aridity was relieved in Africa and western Asia during about 5000-3000 B.C. by a time of greater heat and moisture. It was in this Neolithic period that the boundaries of the Sahara apparently contracted and that it had animals, plants and soils now found far from its margins in savannah country.

3) There have been harrowing, prolonged droughts—as in the terrible drought of A.D. 1276-99 in the south-western North American lands—and these have been followed by more humid times.

4) During the last 50 years there has been a slight tendency toward higher temperatures and lower precipitation throughout most of the arid zone. This is of the order of 5 to 10 per cent reductions, a trend which is small by comparison with annual swings in precipitation.

5) The more dramatic examples of resource destruction during the past 3,000 years must be traced to man rather than climate.

We cannot predict with any confidence that the arid lands will become more or less arid in the decades immediately ahead. They have been in man's short history on the earth both drier and wetter. While aridity as a climatic phenomena is not spreading on a broad front, human abuse of arid lands still is going largely unchecked. The need to halt this deterioration and at the same time to make better use of the remaining resources as a means of improving the life of its burgeoning population presents the central problem in the development of the arid lands.

Behind the problem of social and economic development of the arid lands lies the more basic problem of understanding the processes by which resources are being destroyed and by which they may be used more effectively. While it is often maintained that the pastoral nomads make an ideal adjustment to the sparse grasslands of the Middle East, moving with their flocks to the places of most abundant forage, their record for treatment of the grass resource is far from encouraging.

The combination of inflexible land-tenure systems, a heavy goat population on sub-humid margins, and a growing human population has promoted grazing practices that have not only effected a radical change in the total plant cover but have selectively eliminated many productive species and have substantially reduced the carrying capacity of the ranges.

The upland pastures in the steppe areas of Syria are reported by the Food and Agriculture Organization (FAO) investigators to be subject to continuing replacement of forage plants by non-palatable species. Over great expanses the useful species have disappeared or nearly so.

Often labelled as Public Enemy Number One or as the "black locust", the goat continues to roam and scalp the more humid Middle Eastern grazing lands.

The striking feature of the arid zone cities is their raw, rapid growth. They are expanding at a high rate, pushing out into surrounding dry lands, attracting population from agricultural areas, and in turn placing fresh demands upon those areas for food supply and raw materials. No cities in the United States of America have sprawled more quickly over their dry borders than Los Angeles and Phoenix. Some of this recent increase reflects the mounting exploitation of petroleum reserves. Countries like Iraq and Saudi Arabia which have

EMACIATED DONKEYS forage for sparse grass and thorns on the deeply cracked and riven soil of an arid area in Colombia. In regions where there are no means of irrigation, efforts are nowadays being made to select and breed those plants which can best adapt themselves to rigorous drought situations of arid lands.

© Almasy, Paris

Daily water minimum in Arabian desert: 15 litres

undertaken alternative development programmes with oil revenues may offset some effects of exhaustion.

What seems abundantly clear in connexion with development efforts is that the needs commonly outstrip the possibilities of human action and that two of the principal barriers to effective action are lack of scientific knowledge and failure to translate available knowledge into positive action.

The slow process of scientific inquiry and the careful building of educational institutions must be fostered. These are the two major channels along which UNESCO has tried to move in improving the condition of people in the arid lands.

A Berber tribesman and a California politician have in common the question of whether or not there will be water enough to go around. Shortage of water is the unifying problem of the arid lands.

The one great source of water on land is the natural precipitation. Determining the total supply that precipitation makes available at one place is complicated both by the irregularity and spottiness of the records and by the differing amounts of natural demand. Because the arid lands are sparsely settled, the number of rain gauges is smaller than in more humid regions and certain large expanses such as the Salt Desert of Iran are wholly lacking in gauges.

In areas like the Negev where a few centimetres may be highly important in planning new water control works it is necessary to guess at means and annual variations from the mean, using records only a few decades in length at most, and to try to fill in the great gaps in data by extrapolating from other records and from the corroborating evidence of geochromology and archælogy.

Nor is it yet clear how much water a given field of plants requires in order to attain optimum growth. There are no ready ways of measuring them directly. At least six different methods are in use for estimating required water consumption, and these differ from each other by as much as 30 per cent according to assumptions which it is necessary to make about water and soil processes that themselves are in doubt.

The design of new storage dams and canals in Lebanon or in Peru depends upon these estimates of optimum needs for water. Without them it is difficult to arrive at appraisals of water-use efficiency.

It is not enough to have water of a given quantity; the water must be of suitable quality. Water may carry injurious amounts of either minerals in solution or solids in suspension. One cost of permanent irrigation is constant vigilance against salting.

STILL another hazard in water quality is the silt load which, carried either in suspension or as bed load, may clog up reservoirs and ditches. In many ancient valleys, such as the Tigris-Euphrates, the decline of early agriculture at certain periods is to be traced in considerable measure to the failure of society to deal carefully with the salt and silt menaces.

There is less doubt about animal and human needs for water than there is as to plant needs although man exercises wide discretion in the surpluses with which he supplies himself. The absolute minimum needed to maintain life in a normal adult in the most intense heat of the Arabian Desert is about 15 litres per day, Saharan workmen need a minimum of 7.5 litres and often more, depending upon temperature and type of work. In temperate climates, daily need is sometimes taken as 3.7 litres.

Animal consumption of water varies with age, heat and feeding conditions. Many mammals, such as the desert fox, draw water entirely from their food intake.

In a strict sense, water can be brought wherever man

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Tomatoes that drink dew in the night

wishes if he is willing to take the trouble and pay the cost of carrying out elaborate engineering works or of effecting other changes in the natural cycle of water. Increasingly these works are designed to serve multiple purposes in an entire drainage basin, as in the Rio Grande Basin in Mexico and the United States of America, or in the Oom er Rbia in Morocco. Canals, aqueducts, pumps, diversion dams, storage dams are common devices for changing the place and time of water, but their application to arid land conditions is severely limited by factors of design ingenuity, of cost, and of knowledge.

But there are other means than major engineering for affecting the time and place of water in dry lands. Through the spreading of flood run-off on permeable intake areas the supply of water flowing into underground storage may be increased, as in the spreading grounds of southern California. Plant control may be used in certain favourable circumstances to increase the flow of water, to reduce canal wastage, or to reduce the flow of water.

One of the fascinating technical possibilities is that of reducing losses occasioned by evaporation from water surfaces. In drainage basins like the Colorado the total amount of water lost from reservoir surfaces in a year may exceed the amount put to actual consumptive use in the same basin. If there were a generally efficient means of preventing such losses the available supply might be greatly augmented. Promising experiments in evaporation reduction are under way with mono-molecular films such as cetyl alcohol. Practical application on a wide scale awaits further refinement.

The schematic flow of water in the natural hydrologic cycle is now seen to be subject to modification at many points. Some of these changes, such as storage dams and weather modification, increase the amount of water effectively available to man.

THE impact of man and the intricacies of the plant-soil complex which he has modified are nowhere more evident than in places where patches of arid lands have been protected from goat and plough and axe. In 1955 seven enclosures protecting a total of 29 hectares were established in Mauretania with support by Unesco. Each enclosure gave a different combination of soil, plant and microclimatic factors. Within one year striking changes began to take place in the protected areas. The total amount of vegetation increased.

It is not easy to predict the results of man's various uses of vegetation and soil because there are so many points at which knowledge of the basic life processes is lacking. This is especially true of the processes by which plants use water and by which soil nutrients and solutions are formed.

The selection and breeding of plants for the rigorous drought situations of the arid lands can only be as productive as that understanding. Thus, if it is recognized that a tomato plant can absorb dew from its leaves at night, the way may be open to finding other plants with similar capacities or to breeding up those characteristics in species which would not otherwise prosper in areas with heavy dew fall.

Likewise, the exact means by which plant nutrients are released from their mineral complex in the soil and made available to plant roots through the medium of soil solution or carried upwards by capillary action or downwards by gravity is not well understood. These fundamental processes of soil formation and plant nutrition are important to the management of arid soils in several ways.

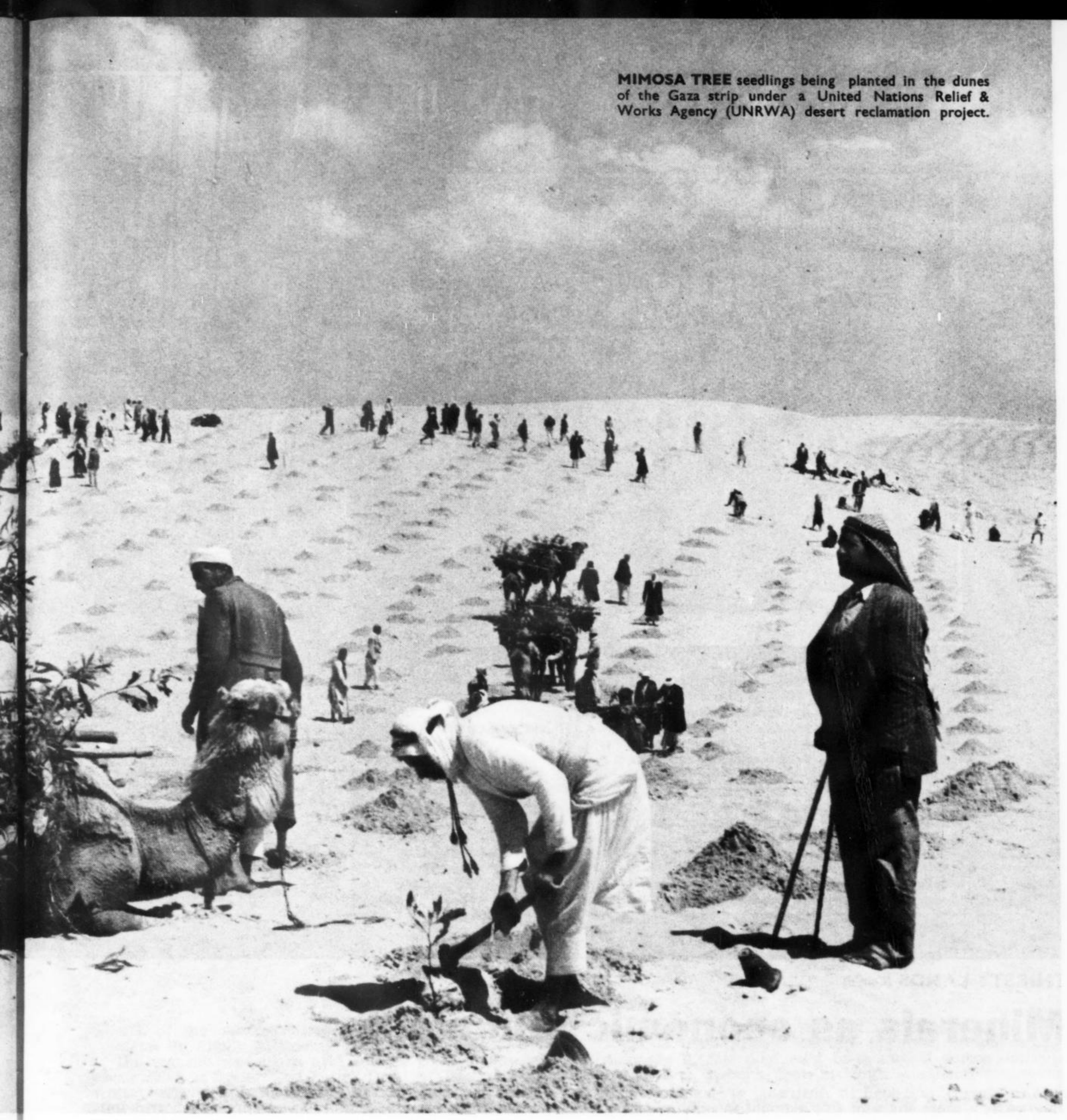
If it were known as well how minerals enter into the soil water solution and how plants accommodate themselves to different minerals, the prevention, cure, and adjustment to salinity conditions would be greatly advanced over the means now available to irrigation farmers.

Unations

❷ STRATEGY OF SC

The desert is popularly viewed as an inhospitable environment which repels animal and man ; actually it supports large populations in relatively healthy state. Nowhere do extremes set up insurmontable barriers to human beings, whether roving or sedentary. And as our knowledge of the physiology of life in arid and semi-arid conditions becomes greater the possibility of making life more comfortable and more productive is also multiplying.

MIMOSA TREE seedlings being planted in the dunes of the Gaza strip under a United Nations Relief & Works Agency (UNRWA) desert reclamation project.



FSCIENTIFIC CO-OPERATION

In Egypt the desert which for centuries has been shunned is now seen as a place of recreation, and in southern California the arid interior valleys once roamed only by mining prospectors are being subdivided for holiday use.

Two of the characteristic urban features in arid lands are the rough new mining and oil towns which rise out of bare desert wastes and the ghost town which marks the site of abandoned mineral operations. The refinery towers of Abadan, the pipeline pumping stations of Syria, the uranium mines of the Transvaal, the copper mining pits of Utah and Chuguicamata, and the well-drilling rigs of the Algerian Sahara are samples of vigorous new mineral developments.

What part of the extracted wealth will find its way into stabilized grasslands or flourishing irrigation projects or productive towns or in devices to harness solar energy? It is estimated that at the current state of exploration approximately 55 percent of all the proven reserves of petroleum and a substantial part of the potential reserves are in the arid countries bordering the eastern Mediterranean and the Persian Gulf. At present rates of production those fields should last many more decades.

The known copper reserves of the world are widely scattered, but are heavily clustered in a few arid areas, chiefly Chile, Northern Rhodesia and the western United States. A few other minerals have high local importance. Manganese in the Union of South Africa and the Ukraine, chromite in Southern Rhodesia, phosphate in Morocco and Tunisia, vanadium in Peru and south-west Africa,

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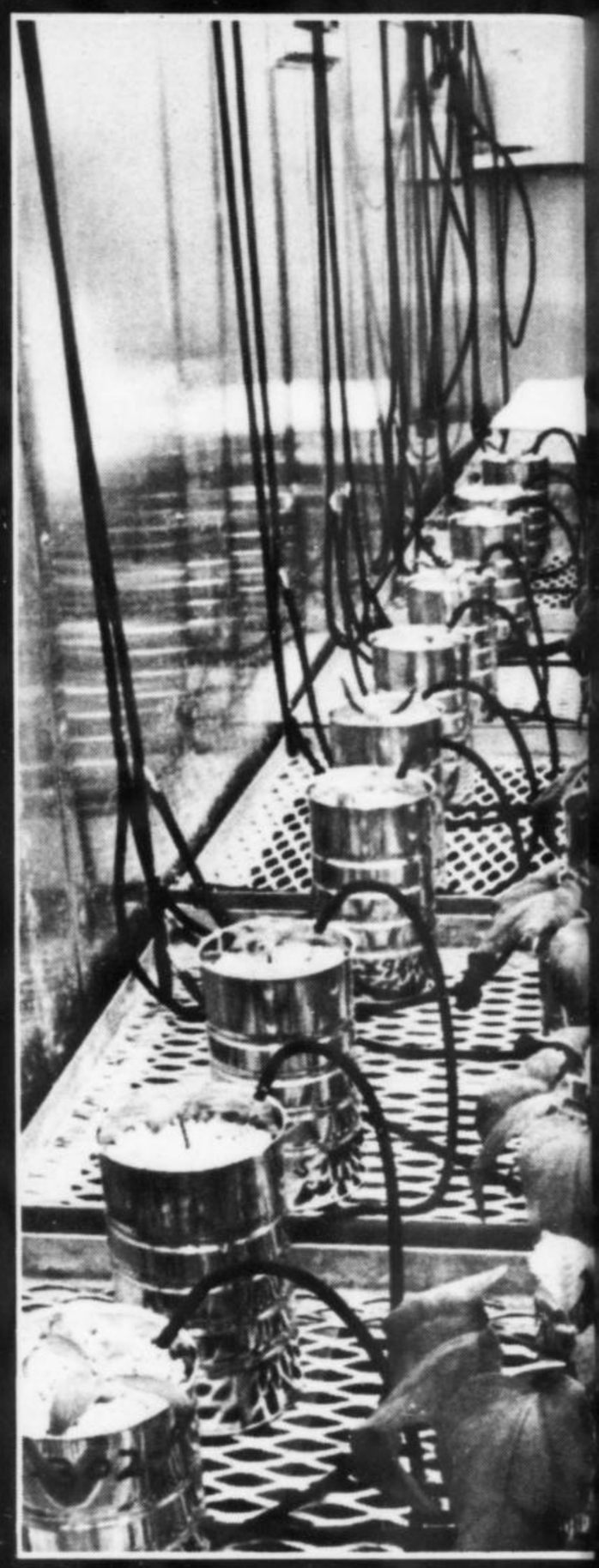
PROBING THE SECRETS OF PLANT LIFE



Manufacturing processes of plants—the greatest factories in the world—are "taken apart" and analyzed in this special agricultural laboratory in the United States. Scientists have now found that all growing plants contain a chemical which is activated by red rays found both in daylight and artificial light. Part of the red end of the spectrum promotes growth while another part encourages flowering. A fuller understanding of these processes might enable the farmer of the future to benefit from a "light control" of his crops, staggering the harvest season and making his schedule easier. Above, photographer records difference in growth of two plants of same age which received same amounts of food. Big plant received longer doses of light. Centre, hose lines carry special nutrient solution to cocklebur plants and (right) bean plant. Everything known to affect plant growth is strictly controlled and analyzed. Light, temperature, humidity and nutrients are changed at will. Basic research into the processes by which plants use water and by which soil nutrients and solutions are formed is an essential part of search for knowledge with which to make far better use of the world's arid lands.

Minerals as economic stimulants

zinc in Mexico, and lead in Australia, are examples. In each case, a large share of the regional income is derived from exploiting these deposits.

One of the direct effects of new mineral exploitation is to open up new roads and airlines to previously inaccessible areas. In time these developments will place still heavier pressures on the remaining local resources of grass and soil. There is, however, the possibility of so using the income from the mineral resources as to promote more effective use of resources which will be available when the petroleum is gone.

During the mid-1950's, seventy per cent of the petroleum revenues in Iraq was set aside for construction by the development board of new manufacturing plants, fertilizer plants, transport facilities, and water-control structures. Similarly, a substantial part of the petroleum revenues in Iran has been used since the early 1950's to support resources development, of which the land and water programme in Quhistan is a major example.

The Quhistan regional development programme includes construction of a hydroelectric and irrigation project on the Dez River, a new sugar-cane and sugar-production scheme, a polyvinyl chloride plastics plant as the beginning of a petrochemical industry, and a fertilizer test and demonstration effort.

In a basic sense, the effectiveness of current use of minerals to support permanent occupance of arid lands may rest on the wisdom with which research results are applied in the management of soil and plants and water.

Just as the natural resources of the arid lands are spotty and variable, so also are the resources of skilled scientists and experienced teachers to deal with the underlying problems of research and of education. Among the newer national units, such as Libya, there are some with only a handful of trained scientists while in others, such as the UAR (Egypt), there are long-established universities. Few have the highly organized central research facilities that are found in Australia, or the Union of Soviet Socialist Republics, or the widespread networks of agricultural experiment stations and agricultural extension workers that have spread across the arid sectors of the United States of America.

In order to gain the quickest practicable flow of research findings into areas where they are needed it is important to speed up the conduct of basic and applied research and to speed its results. No single country may be considered to have solved the troublesome problems of water, soil, vegetation, and sun, and the record indicates that each must be prepared to draw heavily upon contributions from outside its borders if it is to do so in a reasonable period.

USIS photos

Some of the major centres for research on arid land problems lie wholly outside of the arid zone. Basic work on the organic content of arid soils is going forward in laboratories in Zurich and Paris. Demineralization is the subject of lively experiments in Japan and Florida. Water balance studies are centred at a station in the United States of America. The great Soviet Union soils institute has its headquarters in Moscow, and the dominant agricultural research station in the United Kingdom is outside of London.

At the same time there are vital centres of research in the midst of arid terrain. Egypt's work on the Nile is a monument of hydrologic research.

An example of the complex international collaboration involved in a broad research programme is found in the current attacks upon problems of salinity. The frontal attack on the possibilities of converting salt water into fresh is going forward on several fronts with UNESCO serving as a clearing house for information among the far-flung operations.

The problem of salinity recognizes common interests of Soviet soil chemists, New Zealand animal breeders, Iraqi archæologists, and Iranian hydrologists in the hydrolysis processes of soil formation. This is the view that led the Iranian Government to sponsor jointly with UNESCO at Teheran in 1958 the first world symposium bringing together these diverse scientific approaches.

There is no precedent for an international operation which seeks to speed up the research and the information and education linked with it for a great expanse of territory like the arid zone. Certain scientific disciplines have achieved a fair degree of co-operation across national boundaries through journals and occasional congresses.

Thus, the botanists bring together workers in plant ecology at intervals of five years, and the geologists gather every five years in a different country. The proceedings of the International Association of Scientific Hydrology regularly carry the latest research findings in that field to its members around the world.

Confronted with the task of speeding up the action in all these directions an international organization must choose among many methods of helping. Attacking such a problem for the first time, UNESCO in its arid zone programme gradually charted a strategy that followed three major lines.

Its most ambitious effort was to accelerate the whole complex international flow of people and ideas that is associated with the advancement of research. Secondly, it sought to improve the training and education from which scientists and technical workers may be drawn in future. Finally, in a much more modest way it sought to select critical and basic research problems deserving the encouragement of definition and token support.

One issue of strategy which was raised at the international level at the very beginning of the UNESCO programme and which lingers to plague every national co-operative effort is whether or not a specific research

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Research that will shape the future

institution should be named or set up as a centre of arid zone research.

UNESCO decided against a single centre and instead set up an advisory committee representative of the countries involved. This, however, only shifted the issue to the national level where it continues to provoke debate and alternative plans.

In addition to the long-established research centres in other regions, there is now growing up a network of institutes within the arid zone. It would be ideal to have a complete inventory of climate, geology, land forms, water, soil, vegetation, energy sources and human population for each sector of the arid zone.

A practicable strategy of scientific co-operation must recognize that the basic surveys, like the research work, will make a spotted and diverse patchwork which will rarely cover any one area adequately. The technician and the scientist must be prepared to improvise and interpolate, and to draw upon the best that comes from workers elsewhere.

Within the domain of science are numerous channels along which research workers and their findings may move in advancing the limits of knowledge. The distinctively international barriers to scientific advances are the special concern of UNESCO, and it tries to reduce them by strengthening the national scientific agencies and by helping speed up and extend international action. Its stock in trade is ideas and people who can use them.

Thus, government committees have been established in Iran and Pakistan to promote integrated research in those countries and in each case the stimulus came from the call to participate in a UNESCO effort on a larger scale.

A SIMPLE and direct way of speeding up the flow of new ideas is to bring together representative scientists from the chief countries involved to exchange findings and views. In each case, papers reviewing the current state of research are prepared in advance, and then men from as many as two or three dozen nations are given an opportunity to criticize that work and report new contributions. Both the review reports and the symposium papers are then published for distribution to the many workers who were unable to attend.

The impact of a scientific symposium of this sort is widespread. A Tunisian hydrologist learns of new climatological methods which he can apply in designing water control works at home, and he in turn teaches others the concrete results of using archæological studies of ancient wells and terraces in the planning of new structures.

More common is the interchange between workers which enables one of them to leap across what otherwise would have been years of plodding through already discovered territory. A scientist returning to his laboratory from one of the international symposia may carry only a warm sense of fellowship with his workers in other countries or he may be the means of radically revising the research programme of his agency.

Universities of good quality cannot be created overnight where nomadic herdsmen or caravans make their camps. However, for nations that are seeking to leap in a generation over economic development that has taken 300 years in many other societies, a few years time in the maturing of scientific workers may seem crucial.

It has already been noted that much of the resource deterioration in the arid zone is in the face of sound scientific knowledge of possible ways of preventing much of it; from a technical standpoint many irrigated lands need not be salted and the pasture lands need not be eroded.

At least 90 per cent of the Libyans are illiterate. Of the more than 2,300,000 people who inhabit Somaliland, Somalia and other dry lands of the "Horn" of Africa, at least 1,700,000 are estimated to be pastoral nomads.

To reach these proud, roving people with new ideas or even to facilitate their grazing operations by forecasts as to available grass and water in the remote lands which they prowl, is a formidable task calling for devices not generally in use. To speak to them either in pictures or words in a medium which is suitable requires sensitive perception of their culture and an array of printed and audiovisual materials that is not now available.

As one way of helping curb the unknowing abuse of natural resources in the eastern Mediterranean area, a special effort has been made to prepare simple educational materials in the local languages. · Kits of books, pamphlets, posters, pictures and filmstrips have been developed to give essential ideas about resources and their more orderly use to children in the 12-14 age-group and to adults in fundamental education centres.

THESE kits were first tried for children in the Arabic-speaking countries of Iraq, Jordan, Lebanon, Morocco, and of the United Arab Republic on an experimental basis. After some experience, they were reviewed and work was begun on a final set of materials which might be used widely in areas with similar conditions of dryness, plant cover, and grazing and farming systems.

It is in the realm of FAO technical assistance teams and co-operative surveys that the outlines of better pasture management practices begin to take shape, or that regional attacks on the vexing question of salinity in irrigated soils are planned.

Man has the tools to produce more from the resources at hand but lacks the social skills to use those tools. We may regard the arid lands, and particularly their sub-humid borders, as a key test of man's ingenuity in applying his technical tools to keep production ahead of population growth.

The role played by basic research in setting the limits for social development in arid lands is nowhere more apparent than in the struggle to narrow the gap between scientific knowledge and practical action in resource use. If there were miraculously to be an abundance of teachers to work with the Somali grazers and if there were adequate funds to pay for whatever pamphlets, radio sets, slide projectors or posters they might wish, there still would remain the question of what should be taught.

FUNDAMENTAL investigation by the anthropologist and geographer thus must precede sound decisions as to effective ways of using the rich store of developed technology to advance the basic cultural aims of these people. No simple transfer of "know how" will do.

It is remarkable that while there are many descriptions of nomadic groups relatively little is known of the migration routes they take and of the conditions affecting their shifts and their relations to sedentary peoples. The whole process by which nomads choose grazing animals and schedules is obscure. Yet every sound effort to work out an improvement in methods must take such information into account if it is to succeed.

Clouds of ignorance cover numerous scientific areas which, once exposed, could influence man's capacity to live in and use the arid lands.

The important need is to get on with the primarily basic research wherever there are competent men to direct it. No sector of the arid zone has received more concentrated applications of technology and education than Israel with

USIS

INVADING SANDS REPULSED. Standing on a sea of sand, a Colorado, U.S.A., farmer points to a sea of flowers and grasses, a terrain which he transformed from barren rangeland and unproductive sandhills, into a profitable ranch area. For this land reclamation, natural vegetation was allowed to grow. Once established, these plants held the soil and furnished shelter for pasture grasses.

its heavy inflow of capital and trained people. Here, there is a tendency to stress applied science, but there is also lively concern for basic research.

What is the rough balance sheet of human gains and losses in each of the major types of environmental complex in the arid zone?

On the whole, the grazing lands appear to be deteriorating. Notwithstanding large-scale provision of new water facilities, the net volume of grassland resources seems to be on the decline. Where nomadic grazers are in command there is thus far no highly effective means of ordering their operations.

Grassland surveys are setting the ground for needed plans of improvement and management methods are being perfected.

As the ability to select and breed drought and heat-resistant strains of plants is increased, and as understanding of the physiology of drought resistance and endurance in animals is widened, powerful aids in enlarging the producing capacity of the grasslands may well be released. Meanwhile, social research on nomadic life holds the key to unlocking much of the biological work already accomplished but bound by custom and organization into compartments outside the daily stream of resource management.

Among the lands already irrigated it has been shown, however, that at least three major factors affect the prospects for continued use:

1) The widespread problem of salting whose threat to the permanency of many fertile lands will be removed only as farming practices improve and as the understanding of soil-water relations is sharpened.

2) The low efficiency of current water use. This also may be curbed in part by enlightened management and in part by research which in this case might lead to closer estimates of crop needs and of means of reducing water losses through seepage and reservoirs.

3) The increasing competition for water as between irrigation and industrial, municipal and recreational uses.

Taking these factors into account and balancing them against the current investments in new irrigation works, it appears that for the arid zone as a whole there is a net gain in agricultural productivity and in the stability of village life as a result of massive irrigation development. The new dams and canals are strengthening the productive plant.

The most rapid growth in economic productivity in the arid lands is taking place in the areas of oil and metal exploitation, and there the typical sights are new piers, refineries, and smelters.

Essentially, the task of helping make the most of the sparse and variable arid lands is one of discovery and dissemination: discovery of the fundamental facts about social behaviour, water, soils and plants on which refined technological advances may be grounded; and dissemination of the new and practicable knowledge to those who should use it. Thus, scientific research and education march shoulder to shoulder, each reinforcing the other.

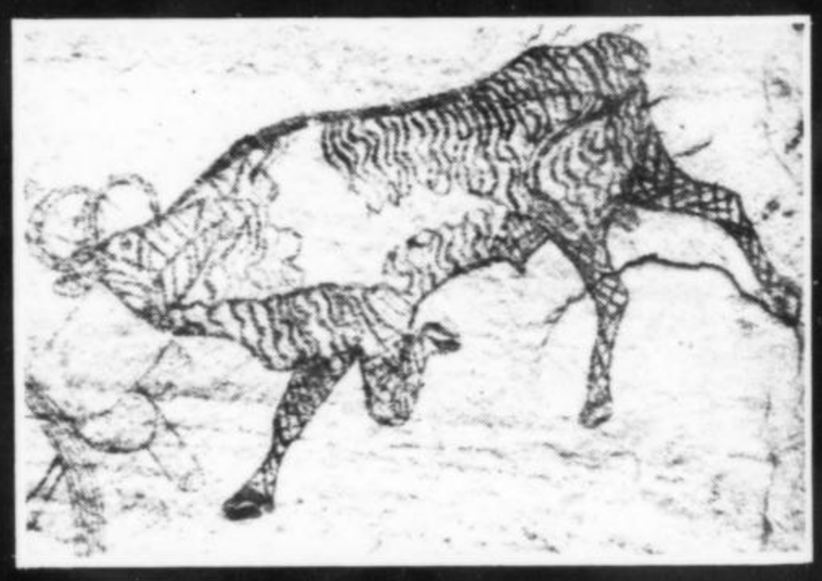
It is this effort to sharpen and speed up the scientific and educational processes that has special urgency for the arid zone while its waters are not yet fully appropriated, while its soils and plants still have some recuperative capacity, and while its minerals still provide the stimulation of investment capital.

Seffar is a typical dried-up and eroded landscape of the eastern Sahara. Yet in the caves among these bare rocks are paintings and rock engravings testifying that this was once the seat of ancient civilizations and fertile lands.

Photos © J. Dominique Lajoux, taken from "Merveilles du Tassili n'Ajjer", to be published by Editions du Chêne, Paris, 1962.

WHEN THE SAHARA DESERT WAS A BLOOMING GARDEN

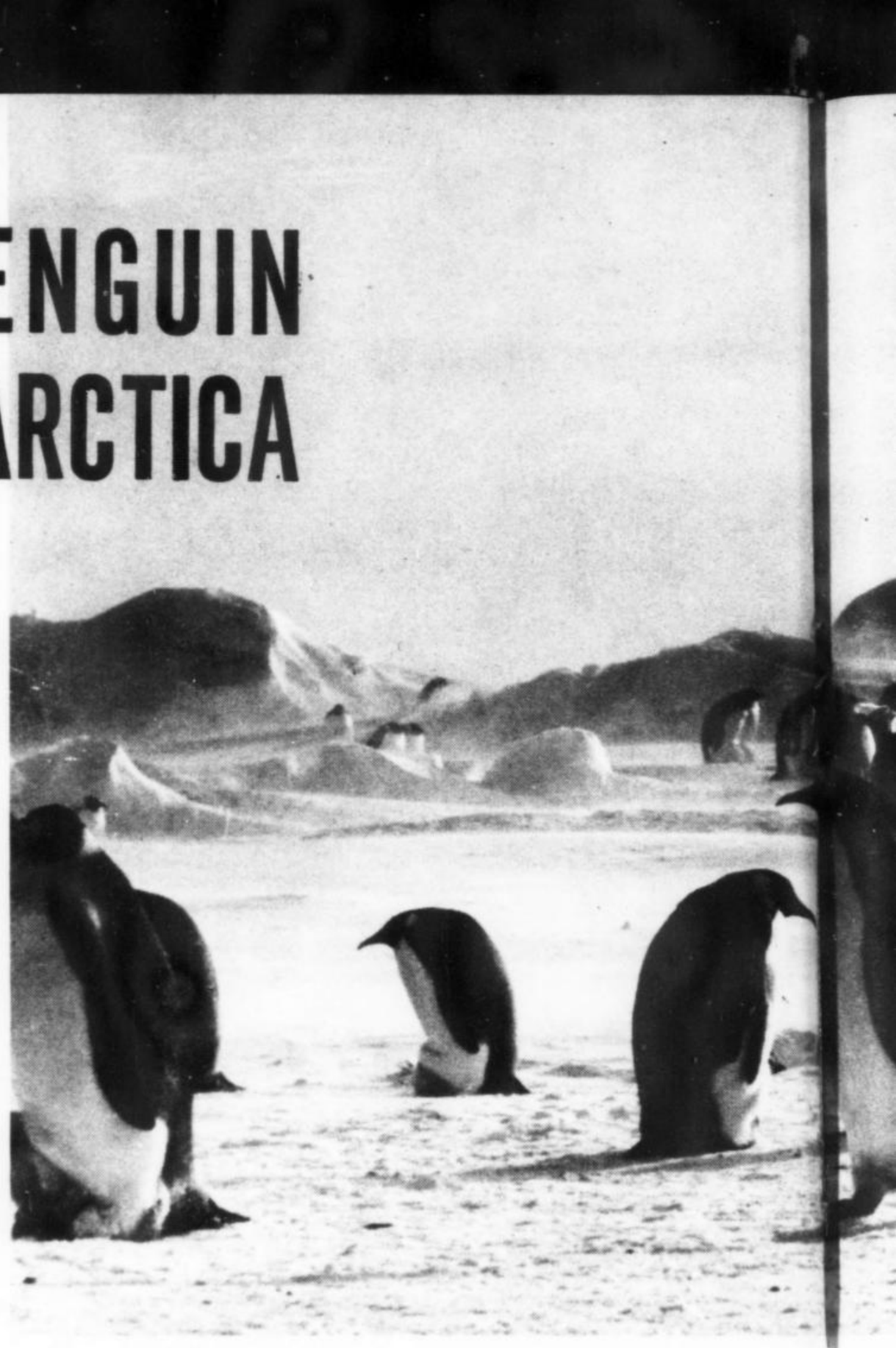
TODAY withered, fossilized and eroded by the burning desert winds, Tassili n'Ajjer in the Sahara (nearly 1,000 miles south of Tunis) was a green and fertile place 5,500 years ago. This has been revealed by innumerable painted and engraved images on its rocks. Analyses made of fossilized pollen unearthed from deep in the ground have now shown that in this area a Mediterranean type vegetation grew profusely. It included lime trees, alders, hollyoaks, cypresses, olive trees and cereals of various kinds. Of all this variety and wealth of flora there remain today but a hundred cypress trees.



Above, painting of a cow at Iherir dates from 2000 B.C. Left, these cattle engraved on a rock at Terrarat, seem to be waiting to drink in the wadi when the next rare rainstorm fills it with water. Opposite page, herd of cattle, a painting going back to 3500 B.C. Some of these rock paintings show as many as 100 head of cattle.

THE EMPEROR PENGUIN MONARCH OF ANTARCTICA

by Jean Prévost



OVER 100,000 EMPERORS, largest and stateliest of the Antarctic penguins, live for ten months of each year in colonies on the ice like the one shown here, in Adelie Land.

Of all the teeming flocks of seabirds which breed and raise their young on the islands and coasts of the frozen continent of Antarctica and in the sub-Antarctic regions to the north undoubtedly the most curious and fascinating are the penguins or *Spheniscidae*.

Comprising 17 species, the penguin family is primarily found in the frozen south, although some of its members breed much further north. The more temperate habitats of some penguins in southern Australia, New Zealand, South Africa and the west coast of South America are certainly explained by the existence of cold marine currents from the Antarctic. The most striking example perhaps are the most northerly colonies of penguins which live close to the equator in the Galapagos Islands off the coast of Ecuador. (See THE UNESCO COURIER, Sept. 1961).

MALE OR FEMALE? With no outward difference between male and female emperors, identification of the sexes is a difficult business. Weighing them, as French biologist, Jean Prévost, is doing here, helps to solve the problem as males are on the average heavier than females. Studies of this kind revealed that heaviest males weigh 88 lbs, females 81, at the start of the breeding season.

With their endearing and amusing appearance and habits, penguins have become the most "popular" and best known of Antarctica's birds. On land they stand up straight on short legs and walk with a flat-footed, clumsy waddle. They are most at home in the water and, using their short flipper-like wings as paddles, they are first-rate swimmers.

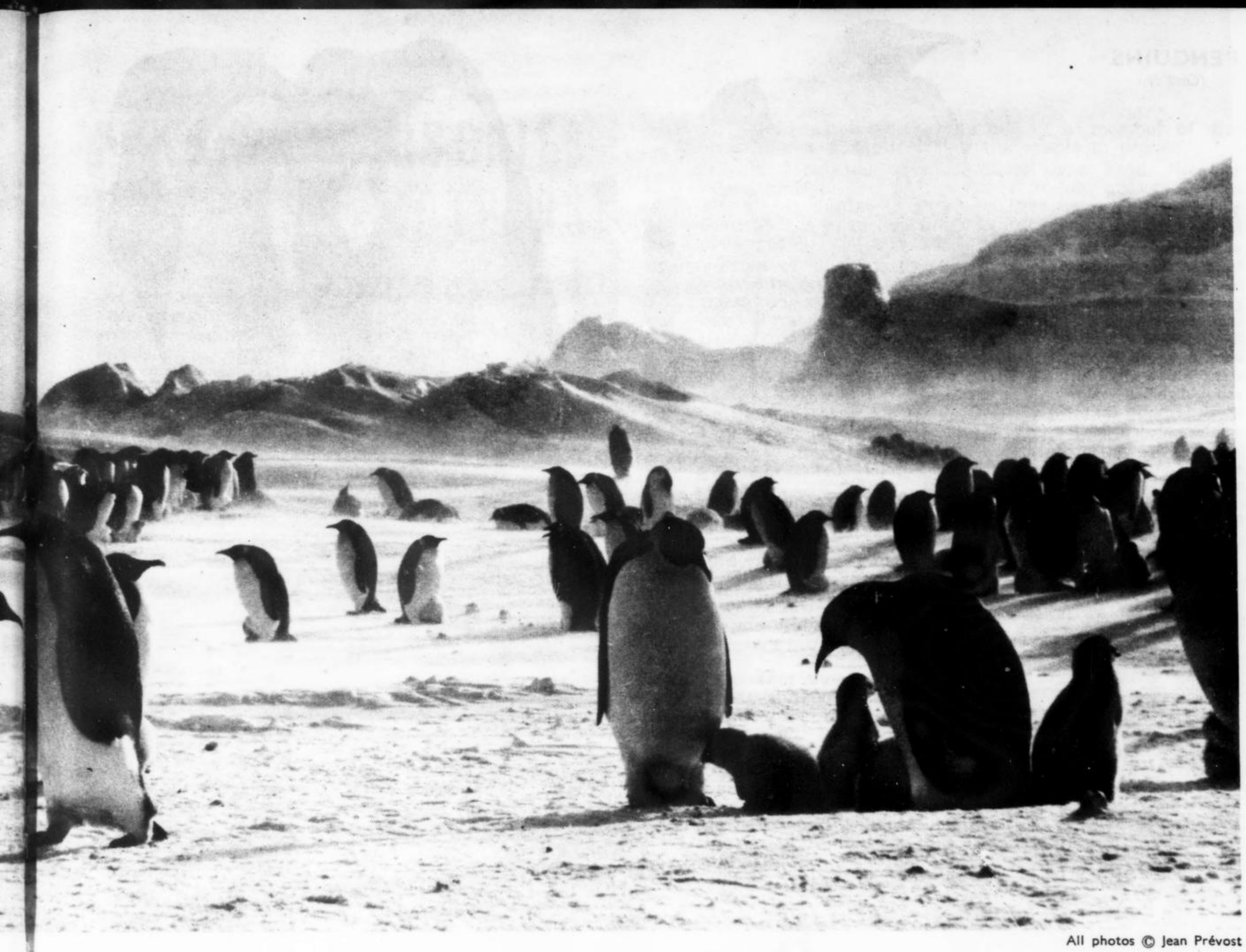
While most of the species offer definite possibilities for observation and studies, one in particular, the emperor penguin, is of special interest. Unlike all other penguins it reproduces its young in the depth of the polar winter in extreme southerly latitudes on the sea ice near the Antarctic continent.

The dangers of navigation by sea in these regions and the utter impossibility in winter of crossing the barrier of sea ice which is several miles deep explain the fact that the first specimens of this species were only recently discovered. It was not until 1820 that the Russian explorer von Bellingshausen had the good fortune to come across them some distance from the coast.

Access to the Antarctic continent is only possible during the summer months after the break up of the ice. But as this break up carries away the emperor penguins, it was not until the beginning of this century that a colony was first visited and studied, while most of the others have only been reached in the last few years.

Until recently there were very few permanent missions on the coast of the Antarctic continent and their limited resources in mechanical transport confined them more or less closely to their stations. Hence, although four new colonies were discovered, it was not until the International Geophysical Year (1957-1958) that new resources and the combination of movement by air, land and sea with powerful and suitable equipment brought the total number of colonies visited to 20.

The total population of *Aptenodytes forsteri* (the scientific name of the emperor penguin) is currently estimated



All photos © Jean Prévost

at more than 100,000, though there is a chance that various other colonies exist in some unexplored regions of the Antarctic coast.

A few individual birds may move north as far as the 60th parallel but the colonies do not go beyond the polar circle and they are not found further south than the Antarctic coast itself. The most southerly colony is in the heart of the Ross Sea, at Cape Crozier, 77° 29' latitude south.

As already mentioned, the emperor penguin breeds on the pre-coastal sea ice. With its heavy gait and relatively small steps, the bird is better adapted to the smooth surfaces of sea ice than to the frequently broken contours of the continental ice which, moreover, would prohibit the semi-permanent winter groupings. Two colonies, however, have chosen to install themselves on the continent which unquestionably affords better conditions and greater security than the surrounding ice floe.

In consequence of their extreme latitude, these habitats have a particularly cold climate. The average annual temperature at Point Geology (Adelie Land, 66° 40' S, 140° 1' E), where one of the most northernmost colonies is found, is in the region of -12° C which is between 4 and 5 degrees lower than for the Cape Crozier colony in the Ross Sea.

Generally speaking, temperature is the determining factor in climate, but in the Antarctic, and especially in Adelie Land, it is the wind which, by its regularity and strength, plays the paramount rôle. Its speed at Point Geology reaches between 30 and 33 feet per second, whereas 50 miles to the east, at Port Martin, it is twice as high. At the latter station, the temperature is two degrees lower than that at Point Geology although the latitude is virtually the same. This clearly highlights the climatic advantages of the places inhabited by the emperor penguins and is surely one of the reasons which guided their choice.

In the course of his extensive research in Adelie Land, Dr. Sapin-Jaloustre examined the potentialities of wind action by means of a heat loss calorimeter of his own construction; this enabled him to define the cooling power of various Antarctic environments. Some figures from his notes indicate the fundamental importance of this for warm-blooded creatures living in the Antarctic climate. Given a temperature of -10° C without wind, it takes 67 minutes 30 seconds for the temperature of the calorimeter's water to fall from 40 to 20 °C whereas it requires only two minutes at -15° with a blizzard-laden wind of 85 m.p.h.

Dr. Sapin-Jaloustre's many experiments led him to conclude that while wind may greatly accelerate cooling power, its high ice-particle content multiplies this factor twofold. The foregoing figures all relate to general climate as defined by daily meteorological checks at a height of 6½ feet for temperature and 33 feet for wind.

Although the emperor penguins have chosen a specially favourable point on the Adelie coast, it is certain that in such an atmosphere they would, normally speaking, have little chance of living and breeding. But since their height is less than 3 feet, they are in fact subject to very much more favourable climatic conditions, as revealed by the surveys of micro-climates.

As early as 1950, Sapin-Jaloustre established that, while temperature varied little in relation to height, the vertical gradient of the wind, on the other hand, was very marked. His study of the micro-climate in the colonies of Adelie penguins (a micro-climate between ground level and 20 inches above) led to the conclusion that its thermal demand was 50% lower than that of the general climate.

A few years later, we were able to observe that the same was true for the emperor penguin colony. The wind at a height of 8 inches was between 50 and 60% lower than the reading given at the same moment by the anemometer at the meteorological station.

Apart from these climatic advantages, the choice of breeding ground would seem to be motivated by a second consideration as important as the first. The existence near the colony of a permanent opening in the ice or of stretches of water free from ice is apparently essential

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PENGUINS
(Cont'd)

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ZIG-ZAG TRAIL left by tail and feet of emperor penguin in freshly fallen snow betrays a waddling gait. Yet despite their short legs set far back on their bodies, emperors move along with a majestic and dignified air which probably earned them their name. Unlike some other penguins, Adelies, for instance, the emperors walk with their flipper-like wings held close to their bodies.

to provide the birds and their young with regular food supplies thoughout the year.

The adult emperor penguin is approximately 3'9" in length, the males being slightly longer than the females. Weight varies greatly according to the time of year. It reaches a maximum on arrival at the colony when males of 88 pounds and over are by no means rare, with the maximum for females being 81 pounds. This variation between the sexes persists throughout the year, the average weight being in the region of 55 pounds, and has the advantage of greatly facilitating the determination of sex in the absence of any sound indication. The sounds made by the birds provide the only criterion for separating males and females since there is no outward difference.

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THE emperor penguin is a particularly calm and apathetic creature which moves over the ice slowly and with dignity. This heavy, swaying gait is in sharp contrast to the speed and agility which the bird displays in the water and his remarkably streamlined body and his sleek plumage indicate the extent to which his morphology is adapted to the aquatic environment.

The pectoral muscles are far and away the heaviest in the body and have several important functions. They cushion the bird's fall when, in order to get on to the ice surface, he throws himself from the water and lands on his breast. They also provide considerable power to the paddles which they operate and which are used not only for swimming but also during fights within the colony when the paddle may strike an opponent with sufficient strength to knock him down.

The coloration of the plumage is noteworthy. The head, the back part of the body and the flippers are covered with a very close blue-black plumage. Two wide orange-yellow marks divide the lateral sides of the head and meet in the region of the neck where their coloration gradually fades into the pure white of the front of the body.

One of the species' outstanding characteristics is the reversal of the breeding cycle. The first emperor penguins return to the colony site in the month of March, the beginning of autumn in the southern hemisphere, when the sea ice has only been covering it for a short time.

The birds at this point are particularly bulky on account of the considerable quantity of fat reserves which may exceed 25% of the total weight of the body.

By April, the whole colony of some 13,000 birds has assembled and its songs and cries shatter the monotonous silence of the Antarctic coast. Each bird seeks a mate, and, after a series of mating cries, the couple come together and remain together throughout the mating period. The creation of such couples is sometimes accompanied by fights provoked by the intrusion of a third bird, generally female, competing with the first female and seeking to oust her. These momentary conflicts end when the

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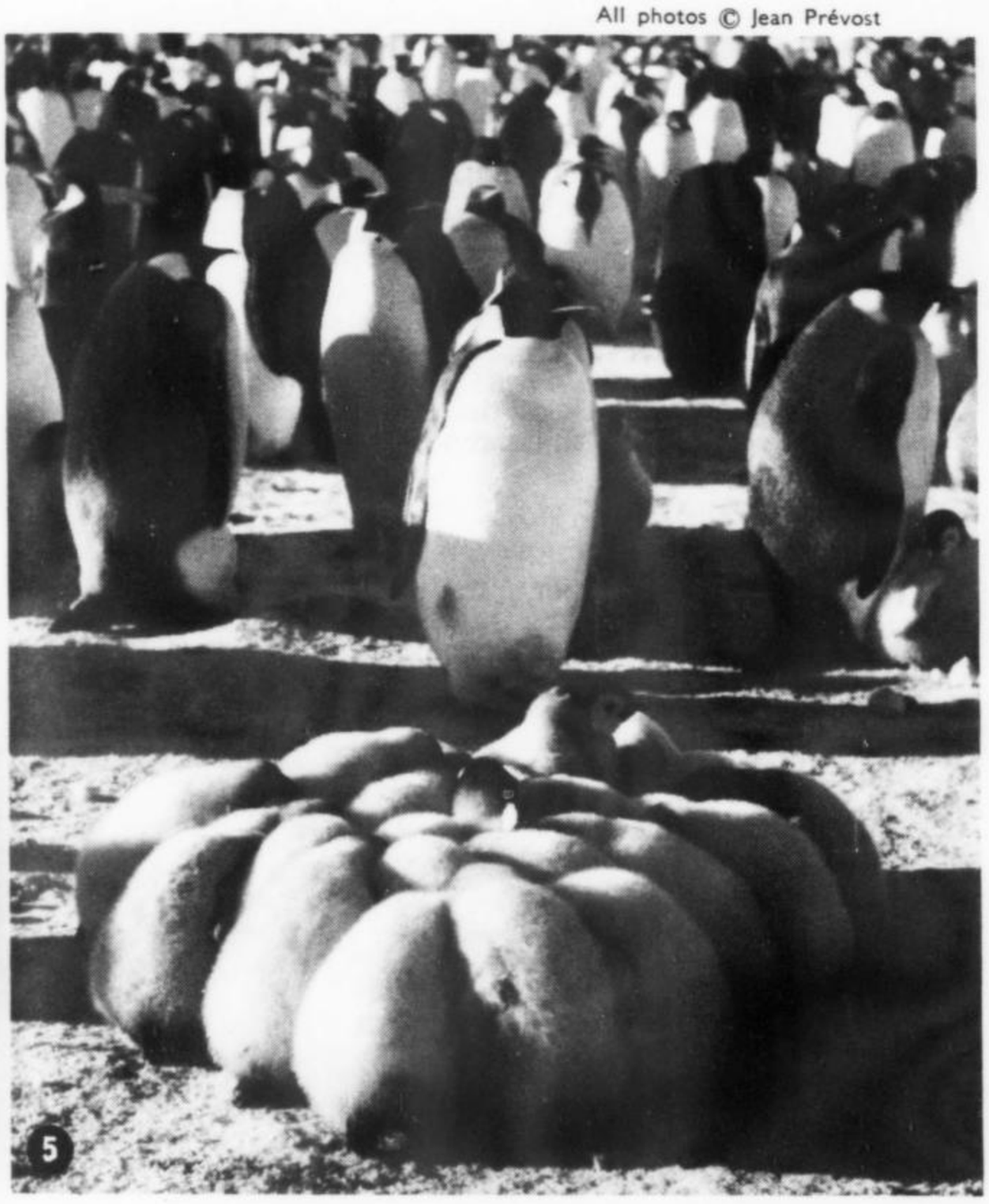
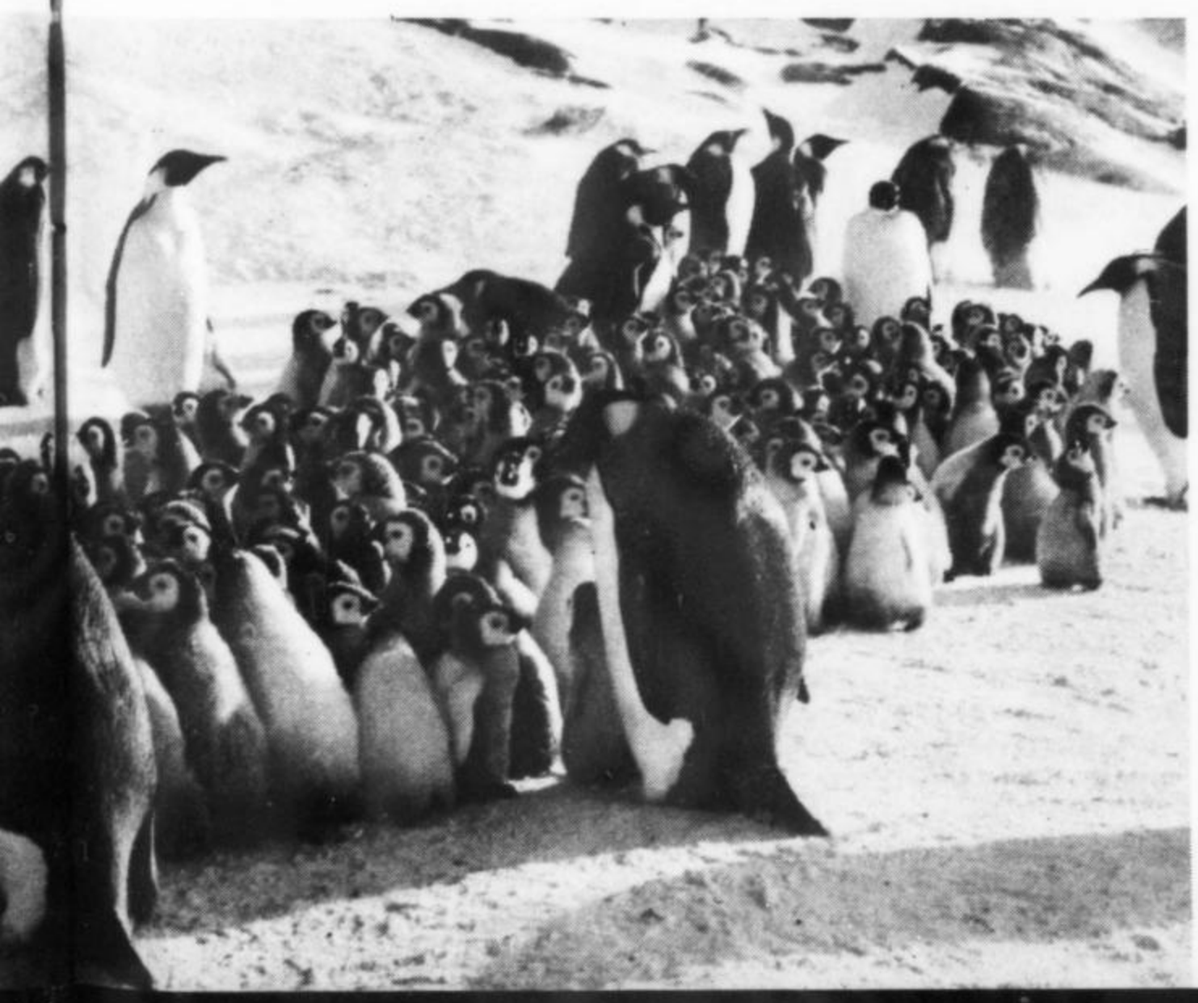
PENGUIN NURSERIES FOR BUSY MOTHERS

(1) Handsome emperor couple with their pure white bodies and blue-black head plumage at the start of the breeding season. (2) Parents take an anxious look at the 4 1/2 by 3 1/2 inch egg which is incubated by the male (he maintains a fast for up to three months before and during this period) and loses as much as 45% of his weight. (3) New-born chick peeps out from beneath its parent's feet where it is sheltered during its first two months of life. (4) Mother nourishes the chick from the pulpy mixture of fish and crustaceans she has stored in her stomach during a prolonged feeding period at sea. (5) A "huddle" of chicks who quickly learn to emulate their parents by gathering together in densely packed groups as a defence against the cold. (6) "Nursery" of youngsters whose parents are away hunting for food. On return the parents "call" in front of the group until they have located their own chick. Family life is thus maintained.

All photos © Jean Prévost





third bird, attracted by the call of a member of the opposite sex, abruptly leaves the couple in peace.

When separated by a scuffle of some kind, the two mates almost invariably manage to join up again soon afterwards thanks to the calls they utter and aided by their ability to recognize one another visually over short distances.

Proof of this recognition was obtained by the use of rings. In order to reduce the disturbance caused by this operation, we habitually ringed couples after they had been formed. The operation calls for three men, two to capture the couple and a third to place the numbered rings on the paddles. The two birds are then released side by side in an isolated spot where they can more easily come together fairly quickly.

The first laying of eggs takes place in May. Each female lays one egg weighing approximately 1 pound and having a length of 4½ inches and a diameter of between 3 and 3½ inches. This volume and weight explains why the expulsion of the egg is often slow and difficult. Once the egg is laid, the female entrusts it to her male partner and leaves the colony in order to seek her food in the sea. The females have eaten nothing since their arrival and have lost almost 25% of their original weight.

There are, however, certain exceptions to this quasi-general behaviour. In 1956, we had occasion to observe several cases of laying by females whose partners, for some unknown reason, were absent from the colony. Such females may hatch the egg for a period of several days but they soon abandon it in order to rejoin their kind.

The incubation of the egg, assured almost wholly by male birds, lasts for from 62 to 64 days at a temperature above 30°C. To maintain this temperature, the egg is placed on the feet of the brooder and protected from behind by a sort of incubation pocket and in front by a fold of abdominal skin. Even while carrying this fragile burden, the male can cover short distances in an upright posture and can even glide on his chest without dropping the egg.

SINCE the egg is hatched in the middle of winter, it is not surprising that the birds' physical and vocal activity should be greatly reduced. Additionally, the brooders have taken no food since their arrival and can only do so when their task is taken over by the females. How do they manage to go without food for so long in such a chilling atmosphere? The system they have found is as simple as it is effective.

To reduce as far as possible their loss of warmth during blizzards, the birds gather in extremely densely packed groups or "huddles." Each bird in such groups, which may include virtually all the brooders of a given colony, is pressed close against the others and benefits from the warmth which they radiate. Since the group as a whole is all but impermeable to wind, the micro-climate within the "huddle" enables each individual bird to effect a slight reduction in his central temperature and thus economise on his fat reserves.

In this way the duration of the foodless period may be markedly prolonged. Various experiments, moreover, showed us that a bird subjected to total isolation and directly exposed to the cold and storms had little chance of completing incubation of the egg since his daily loss of weight could amount to twice that of those birds able to join a "huddle."

Some of these experiments were carried out on a breeding ground which we set up on the exact site of the colony. Between 6 and 12 birds were kept within this ground, thus forming a sort of small-scale colony with very much reduced means of defence against the cold. Some of our captives remained there for over three consecutive months.

This special social behaviour or forming "huddles" has been made possible by the absence of nests and hence of fixed dwelling places and by the reduction of the antagonisms and conflicts which are so frequent and so extreme among other species of *Spheniscidae*.

Having completed their journey in search of food, the females return to the colony a few days before or after the eggs are hatched. In the latter case, the death of the chick might seem inevitable but, in fact, such is not the case since the male bird's crop is capable of secreting

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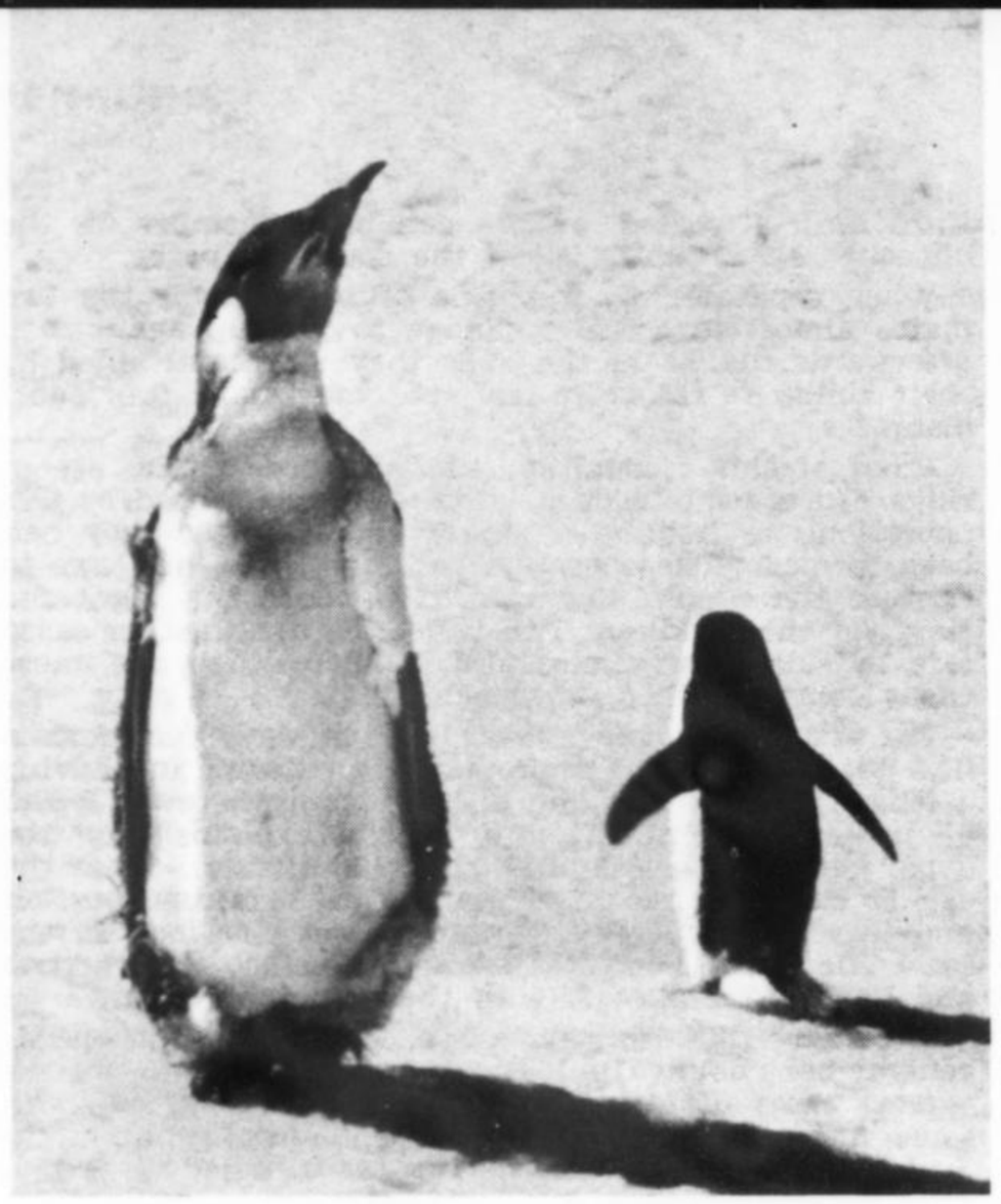
Life-saving huddle



FRIGID ENCOUNTER between an emperor penguin (who manages to look stiff and haughty despite his moulting plumage) and his smaller cousin, the Adelie penguin. Emperors average 3 feet 6 inches in height; Adelies are rarely more than 15 ins.

FIRST VENTURE into the ocean by young penguin chick (left) marks his complete independence. From now on he will hunt for his own food. Penguins lose their clumsiness the moment they enter the water. Wonderful swimmers (right) they can catch fish under water with great ease.

THE SNOW EATERS (foreground, above) are demonstrating an old penguin custom—drinking from snowdrifts, by plunging their beaks deep inside and swallowing snow whose temperature is often as low as -20 degrees C. Below, penguins taken from main colony by French biologists for heat loss studies. These showed that isolated birds exposed to cold and storms could lose twice as much weight as those grouped in large "huddles".

All photos © Jean Prévost

a whitish substance resembling pigeon's milk even after a foodless period of as much as three months.

The exceptional nutritive quality of this emergency diet enables the chick to wait for the pulpy mixture of fish and crustaceans which the females have kept in their stomachs during their time at sea for the benefit of the young bird. In July, the thin and famished males (who have lost almost 45% of their weight since arriving) set off in turn for a period at sea.

While they take no food during their stay in the colony, they do drink regularly, finding this liquid in snow they take from small and especially clean drifts. They plunge their beaks deep in the drifts and absorb quantities of snow whose temperature is often as low as -20° C. The "snow eaters" tend be more numerous when the humidity level of the air is low and we observed that, for some time preceding the thaw, the majority were females. This need for water is probably due at that time to the preparation of the constitutive elements of the egg.

Chicks weigh approximately 11 ounces when hatched. The scattered grey down which they have at birth gradually thickens with age and eventually forms a sort of thick fur an inch or more long. During the first two months, the young bird remains sheltered by the feet of the male parent or the female who takes over periodically in order that her mate can feed. These two months, moreover, are not wholly free of danger. A certain number of birds of both sexes, having lost their own chicks, are determined to steal those of their neighbours. They sometimes succeed, despite the parents' resistance, but there is every chance of the chick being crushed or pecked to death during the fight between the adults.

After September, the chicks are able to maintain their internal temperature at a constant level unaided. At this point they are left to themselves in the colony. They weigh about 4½ pounds and are too bulky to remain any longer on the adult's feet. This abrupt transition from family life to freedom exposes them suddenly to cold and blizzards. The death rate would therefore be relatively high but for the fact that the young birds group together for protection in "huddles" like the adults.

Most deaths observed at this period occur during blizzards. The chicks, weakened by undernourishment, no longer have the strength to gather in "huddles"; they accordingly lie down on the ice to which they are soon attached by deposits of snow. This ice gangue insulates them from the external atmosphere but thereby only prolongs their sufferings. Other chicks fall in the crevasse which opens at low tide between the land ice and the sea ice; we succeeded in saving a number from being crushed by the closing of the break at high tide.

From September onwards, the two parents are able to go away together hunting for food to satisfy the growing appetites of their offspring. Even so this change to an independent existence does not lead to a sort of communal pooling, with each adult feeding a chick taken at random. On the contrary, family life is maintained and, on returning to the colony, each parent calls in front of various groups of young emperors in order to locate its own offspring. In this search by calling which varies in length according to how far the colony is dispersed over its territory, visual recognition also plays a part.

After these preliminaries are accomplished, the chick slips his beak into that of the adult which thereupon regurgitates a part of his or her stomach contents. The chick rapidly grows to a weight of 22 pounds, at which point he can consume up to 6 or 8 pounds in a single meal.

By the beginning of December he weighs close on 30 pounds and his down begins to fall by patches and is replaced by young plumage. When the down has almost completely disappeared, the young emperor (who, for several days past, has no longer been fed by his parents) moves towards the sea. He is then quite independent. After spending a complete year on the edge of the ice pack, during which period his weight almost triples, he

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All photos © Jean Prévost

ANTARCTIC RENDEZVOUS for thousands of emperor penguins is in March—start of the Southern Hemisphere's autumn—when they gather at some 20 colony sites like that above at Point Geology in Adelie Land (13,000 birds have been counted here). Penguin, below, looking like a block of stone, has turned its back to the howling blizzard. One youngster has strayed from its parents and crouches down in the snow to the rear of the penguin in the foreground. The warm side is already occupied by another chick.

Crushed by an iceberg

acquires adult plumage at the end of a month-long moult on the coast.

While the death rate for eggs and chicks is low during life in the colony (roughly one-quarter of 6,000 eggs laid), life on the sea, where virtually all the predators are to be found, brings a great increase in mortality. A premature break-up of the sea ice, before all the chicks have finished growing, may reduce the number of survivors still further.

But we also saw a still more impressive sight. On December 26, 1952, a piece of an iceberg freed by the break-up came hurtling down with a thunderous crash onto a group of chicks and scores were crushed to death or drowned.

The emperor penguin's biology, which was such a mystery a few years ago, can now be seen and understood more clearly.

The reversal of the reproduction cycle, probably due to the winter period spent on the sea ice, enables the chicks born in July to complete their period of growth by the time the ice break-up takes place. They can therefore take immediate advantage of the abundant marine life of the summer.

The adult's highly developed individual and social adjustments enable him to live and breed in the middle of the Antarctic winter with a relatively low death rate. The emperor penguin is truly a remarkable bird.

JEAN PREVOST is a member of the biological research staff at the National Centre for Scientific Research, Paris. M. Prévost spent the winters of 1952 *and* 1956 *at Terre Adélie as biologist for the Expéditions Polaires Françaises. He made a special study of the emperor penguin for his doctoral thesis, "L'Ecologie du Manchot Empereur," which has been published by Hermann, Paris,* 1961.

THE STORY OF ARTHUR & HALF PINT

In 1952, Jean Prévost and the members of the French Antarctic Expedition encamped for the winter at Point Geology, Adelie Land, decided to become foster parents to two young emperor penguins. Their purpose was to study the effect of artificial rearing on the growth and behaviour of these two chicks. "We had no trouble in finding things for them to eat", writes Jean Prévost, "for the ice around was strewn with food which the other youngsters in the penguin colony had discarded as too large to swallow."

"Our two chicks quickly learned to come in answer to a special whistle and soon appeared to look on us as their parents.

"Arthur and Half Pint, as we named them, lived like this for five months without ever seeing the colony where they were born. Arthur became rather shy, but hunger quickly banished fear when mealtimes came.

"When we left Adelie Land to return to France we took the chicks with us. But Half Pint, the weaker of the two, died before we reached Australia. Arthur, however, quickly got used to the heat of the Indian Ocean which probably reminded him of the stove in our camp against which he used to warm himself. But he was no luckier than Half Pint and died of food poisoning while the ship was docked at Port Said".

Fresco painting of Euphemius Mtatsmideli (958-1028 A.D.) an important Georgian composer of religious music. The musical notation used in Georgian mediaeval hymns has for long intrigued and puzzled scholars and it was only recently successfully deciphered.

Manuscript of ancient hymns copied at the end of the 10th century under the direction of Michael Modrekeli, a great Georgian poet and composer. Miniature in the margin depicts John Mtbevari, a Georgian 10th century hymnologist and St. Basilius of Caesarea, to whom the hymns in this manuscript are dedicated.

Miniature of a 13th century Georgian manuscript representing a dancer and his accompanying musicians playing cymbals, a lute, a flute and a tabor.

LOST HYMNS OF GEORGIA'

A 1,000-year-old musical mystery unravelled by a Soviet linguist

by Pavle Ingorokva

All photos furnished by the author

Faun playing an aulos (flute). Ist century A.D. bronze found in Georgia. Flute is missing.

HERODOTUS, the Father of History, began his great work with an account of the relations between the Greece and the Colchis of hoary antiquity, a full thousand years before our era. Colchis—the legendary land of Medea and the Golden Fleece—lay in the west of Georgia. Its mention by Herodotus gives some idea of ancient sources of Georgian culture.

Situated in the Caucasus, the crossroads of Europe and Asia, Georgia is a land of European culture blended with that of the East, a kind of synthesis of both traditions.

Georgia's links in distant antiquity, with the lands of the classical East—Assyria, Babylon, the empire of the Hittites and Urartu—can be seen from monuments of material culture and the testimony of cuneiform inscriptions dating back to the second millenium B.C. Another indication of ancient Georgia's links with the West, the world of Hellenism, is the existence of such well-known legends as the voyage of the Argonauts from Greece to Colchis, which stems from the Homeric epos, or the story of Prometheus, chained by order of Zeus to a rock in the Caucasus. This wonderful legend originated in Colchis, and found artistic expression in Aeschylus's masterly tragedy.

Later, during the Hellenistic and the Roman periods, Georgia was an independant state with a high level of culture. In the first and second centuries A.D., Georgia played an important part in Rome's relations with the East, the political authority of the Georgian state being spoken of by ancient authors, who described the honours paid by the emperor Hadrian to Pharasman II, king of Georgia, during the latter's visit to Rome in 138 A.D. The Georgian ruler took part in an important religious ceremony, offering a sacrifice in the Capitol, and having an equine monument raised in his honour in the temple of Mars.

Christianity became the State religion of Georgia in 337 A.D., and during mediaeval times it was one of the leading countries of the Christian East. Unlike Byzantium, Georgia also saw an efflorescence of secular literature, especially in the twelfth and thirteenth centuries, which may well be called the Golden Age of Georgian culture.

It was during the latter period that there developed a humanistic current comparable with the Renaissance in Europe, which came later. This was the era of Georgia's great poet, Shota Rustaveli, the author of a poem of genius *The Knight in the Tiger-Skin*, a new translation of which is being prepared by UNESCO. This work by Rustaveli, who can justly be called a great bard of humanism, was an early forerunner of the ideas of the Renaissance.

An important place in the cultural heritage of ancient Georgia is held by manuscripts of professional music, which go back through the Middle Ages to antiquity. These records consist of manuscripts of early Christian hymns, with the verses of the texts accompanied by a musical notation located over and under each line of the text. The musical characters are in vermilion, as distinct from the text, which is in black.

The nine extant manuscripts of ancient Georgian music refer to the tenth and eleventh centuries. Five of them are in Georgia, one is at the Monastery on Mt. Athos in Greece, and three are in the library of the Convent of St. Catherine in Sinai.

Of these manuscripts, the most important are two in the possession of the Manuscripts' Institute of the Academy of Sciences of Georgia. One is a collection of hymns copied in the years 978-88 under the guidance of Michael Modrekeli, a great Georgian composer and poet. The other is a collection, copied by Jordan at the close of the tenth century. The repertory of these manuscripts pertains in the main to the eighth, ninth and tenth centuries. The notation used was found to be much older. The manuscripts contain a total of about 1,300 chorals, the repertory being very extensive.

The music recorded in such ancient manuscripts, and the system of notation used have long intrigued scholars, but until recently all attempts to decipher them were unsuccessful.

This interest was enhanced by the fact that the evidence of history shows that ancient Georgian music was quite independent in character, quite distinct from Western, in particular Greek, music.

An 11th century source speaks of the existence of two kinds of vocal music—Greek and Georgian, the former being homophonic, and the latter being sung in three voices. It is a fact that from most ancient times the peoples neighbouring on Georgia knew only homophonic music. For instance Greek music, both antique and mediaeval, and for that matter right down to modern times, was homophonic. The peoples of the East use homophonic music to this day.

CONSEQUENTLY, Georgian music with its developed polyphony—both in folk songs and church music, and its original harmonisation—was an exception to the environment, a kind of island in a sea of homophony. The Christian church inherited this polyphony from pagan practice. Ancient sources point out that whenever the texts of church hymns were translated into Georgian from the Greek, the accompanying music was written anew, for, as a twelfth-century Georgian source points out, "alien to our people are the Greek incantations."

The deciphering of ancient Georgian musical notation was preceded by an important discovery in the field of ancient Georgian poetry, which helped to unravel the mystery of the notation problem.

In the course of my research into the history of ancient Georgian literature, I made a study of church hymns, i. e. texts supplied with musical characters. At first the hymns I studied interested me as literary monuments.

It should be noted that these hymns were always considered purely prosaic works, because there was no division into lines of verse in the manuscripts. In ancient times, however, verse was not divided in separate lines; this is borne out by manuscripts with ancient Georgian iambics.

I found I could discern a complex rhythm in the hymnal

CONT'D ON NEXT PAGE

Pattern of dots

texts, and then saw that they had a definite metrical structure. I also saw that the dots in the texts could not be considered ordinary punctuation marks. They seemed to have some other kind of function. When I counted the number of syllables between the dots, I found a definite pattern. Thus, in the first paragraph in one of the hymns the number of syllables between the dots was as follows: 7, 7, 7, 11, 7, 7, 5; the following paragraphs had the same pattern, and so right through till the end of the first canto of the hymn. Another text revealed the following pattern: 5, 10, 5, 11, 5, 8, 10, and this was repeated in all the paragraphs of the text.

All the hymns, without exception, were built on the same kind of pattern.

It followed that the dots in the texts denoted their metrical form—unrhyming verses with a clear strophic structure. Each strophe was followed by an antistrophe, which repeated the metrical structure of the first strophe with absolute fidelity.

This parallel-strophe structure is analogous to that of the ancient Greek choral lyrics, and also of the verses sung in ancient Greek tragedies.

It was in this way that the discovery was made of a new and rich field of ancient Georgian poetry—the hymnic.

The discovery of the metrical form in the hymns led me up to the problem of how their musical notation was to be deciphered—the close link between musical and metrical rhythm in ancient times is well known. In the texts examined, too, the complex rhythm and the wealth and variety of the rhythmical pattern, as well as the metrical conformity of strophe and antistrophe, indicated the presence of an unseparable link between the verses and the accompaniment. The problem was to uncover the secret of that music, whose surge could be felt in the texture of the verses.

Ghelati, ancient centre of Georgian music.

There was one musical character whose meaning I realized before I started work on the texts of the hymns. I have already mentioned that the texts were in black, and the musical characters in vermilion. All the black dots in the texts corresponded to a red dot in the musical notation. There was absolute consistence in this relationship, so the evidence seemed to show that each red dot had a metrical function.

To start with, I copied out and classified all the characters, of which I found eighteen (including those indicating variations). A detailed comparison of these characters with those current in the musical notation used in mediæval Europe showed that they were quite different, and, what was of special significance, the Georgian characters were fewer in number than the European. It was clear that the former differed not only in outline but in structure.

After long consideration as to why the Georgian musical characters were fewer in number than the European, I reached a conclusion that put me on the right track.

I realized that the Georgian characters were few in number because Georgian notation was based on a musical alphabet, distinct from the other mediaeval systems of notation, which were not alphabetic, but hieroglyphic.

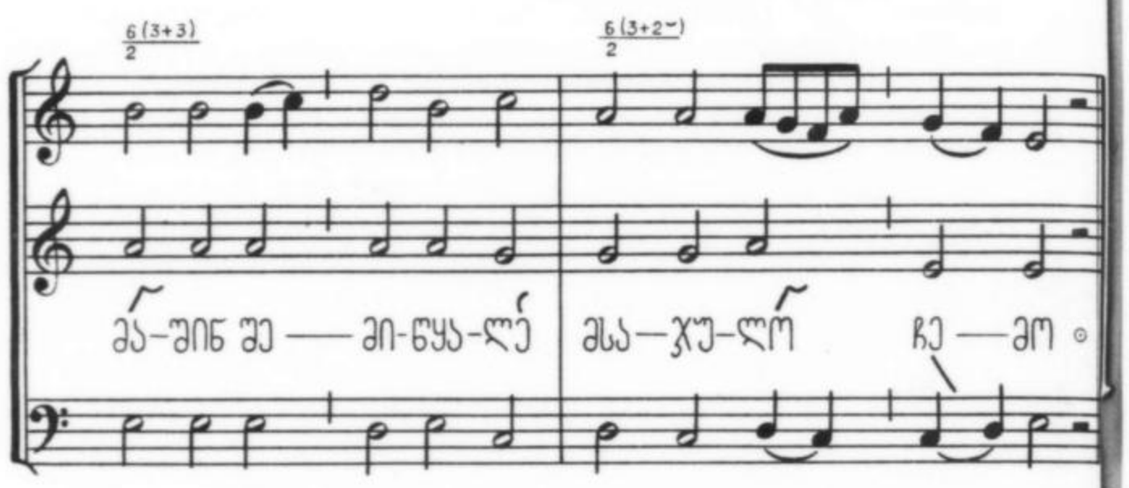
The first step lay in establishing the frequency of the characters used in the notation—how many times each character was used in all the cantos of the manuscripts with musical notation, and the number of syllables to each character.

This count revealed that there were eight basic characters in the system of notation, the others being ancillary and rarely used. The supplementary characters were not independent, but were a graphic variation of the basic characters.

The discovery of eight basic musical characters or notes confirmed the original surmise that the Georgian musical notation was alphabetic, and the fact of eight characters coming to light was an indubitable indication that the notation was based on the octave—the eight characters represented the eight notes of the octaval scale.

This important step along the road to the uncovering of the secret of the ancient musical notation of Georgia was followed by an inquiry into the order of the notes in the octave.

The octaval scale, as is well known, falls into two parts —the lower tetrachord or diatonic series of four tones, and the upper tetrachord, also of four tones.



Modern transcription of a hymn composed by Gregori Khandsteli (758-860) a composer of mediaeval Georgia. The notation of the leading melody (leader of the voices) or "cantus firmus" is given in the centre (above the original 10th century notation). This hymn was noted down by members of the Georgian Society of Church Music in the 19th century. Parts for the accompanying voices are noted here on the upper and lower staves.

The Georgian notation under discussion also has the same division of eight notes into two series. One series of four characters is written below the line, which makes it obvious that it corresponds to the lower series of the octave; four characters are written above the line, thus giving us the upper series of the octave.

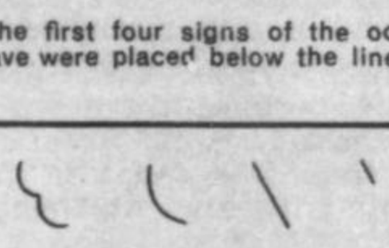
Next came the question of the order of the four characters in the lower series, and the four of the upper series.

This was ascertained from the shape of the characters. As was to have been expected, and indeed proved to be the case, the notes were not a chance array of characters, but followed a definite system, which showed that the graphical aspect of the Georgian notes was built to suit the octaval structure. Indeed, the order of the notational characters emerged from the graphical links between the individual signs, the gradual transition from one to another.

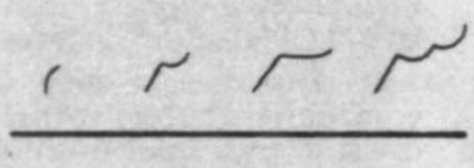
The coincidence of characters and musical pattern does not stop at this stage.

GEORGIAN NOTATION

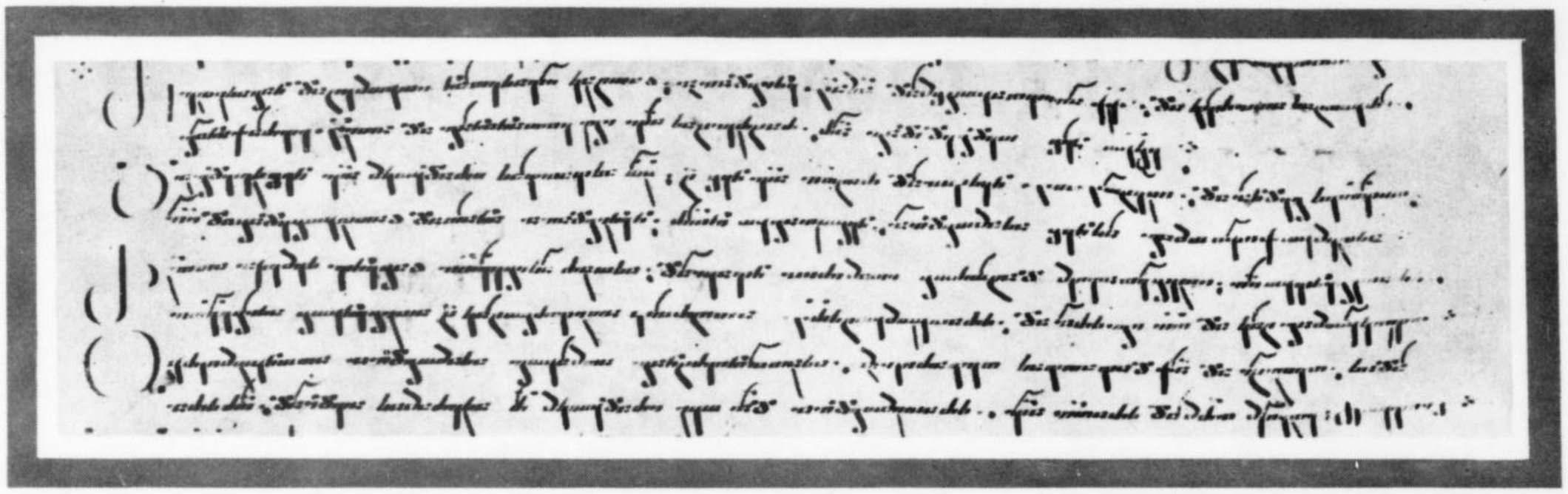
The first four signs of the octave were placed below the line.



The last four signs of the octave were placed above the line.



The signs (left) which resemble modern shorthand writing are, in fact, ancient musical notes. Each one of the eight signs shown either above or below the centre line corresponds to one of the eight notes in the octaval scale in the Georgian musical notation of the Middle Ages. This notation which might be called "alphabetic" was a distinct advance on the "hieroglyphic" systems of mediaeval notation (where a sign represented a group of notes or even several musical phrases). The first four notes of the octave (the lower ones) become simpler and smaller in size as they ascend and the last four (above the line) gradually increase in size and become more complex in form as they ascend



Part of a hymn composed in the 10th century by Michael Modrekeli and entitled "The Resurrection of Christ." The meaning of these strange little musical characters written in red and placed above or below the texts inscribed in black, and their melodies remained a mystery for over 1,000 years.

The extreme characters, i. e. the first in the lower series and the last, the eighth in the upper series are related in outline. The eighth sign repeats the outline of the first with the addition of a pennant. The parallel is logical, since an inverted prime becomes an octave.

The sequence of the signs was checked in other ways.

It has been observed that the sign for the fifth tone of the octave is of far more frequent occurence in church incantations than the octaval, since the fifth forms, as it were, the centre of the melody in church music which accounts for its having been called the dominant.

Further: the tonic, i. e. the prime or the eighth note in the octave should be heard in the concluding measure or bar of each hymn. This was also found in the notation under discussion.

Thus, success attended the efforts made to establish the sequence of musical characters in the notation. This was the second step towards achievement of the aim set.

Further study of ancient Georgian sources enabled me to find out the names of the signs and the notes of the octave, which fully bore out the conclusions drawn from the decipherment.

The next and most radical step was to determine the tone denoted by each particular character, i.e. to find the "key" to a reading of the octaval notes.

Woman playing the aulos.

In the early stages of the inquiry I noticed that the first line of each hymn contained an indication of the voice it was to be sung on. In all, eight voices were named a sure indication of the diatonic tonality typical of the music of the ancient Christian church. Each "voice" provided a precise indication of the way the signs of the octaval gamut were to be read. It follows that the "voices" in the ancient Georgian notation performed the function of the keynote in present-day musical notation.

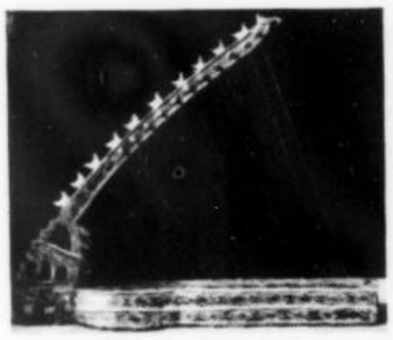
This was the final step made towards the decipherment of the musical notation used in ancient Georgia. It was clear that the inscription as to the "voice" to be used showed the existence of eight tones of the octave within each voice. Indeed, eight characters were deciphered in the manuscripts, all this bearing out the correctness of the conclusions drawn.

It thus became possible to express the hymnic melodies in notation. Just as in Roman Catholic church music until the thirteenth century, in which only the leading voice, the tenor or *Cantus firmus* was recorded in notation, the Georgian manuscripts had the leading melody in notation (the so-called *dzlispiri*—the "leader of the voices") the accompanying voices following the set pattern of the Georgian folk harmonisation, and providing a background to the melody.

Reading of the musical texts now became possible, so I began to transpose the tenth-century notation into modern notation. I began with a hymn in honour of the Virgin Mary, entitled Gikharoden ("Ave Maria"), and I cannot find words to express the thrill of first hearing melodies dating back a thousand years.

Had the decipherment been false, the result would have been a mere jumble of sounds. As it was, I heard a splendid and impressive melody. In all the eighty hymns I next deciphered, the result was the same—music marked by integrity and depth of thought.

I then decided to find out whether the ancient tradition had been preserved in the church melodies used in Georgia in the 19th. and 20th. centuries, and, if so, which elements, and what relation existed between the ancient style and the modern.



A Georgian lute.

The appropriate texts were found at various libraries in Georgia. Among the numerous records of 19th century church music that were examined, over 300 hymns with three-part music were discovered, whose texts coincided with those of the 10th century hymns analyzed. They had been taken down in notation in the 19th century by members of the national society of Georgian church music.

To what period does the invention of the ancient Georgian musical notation belong? What place does this music occupy in world musical culture?

The evidence available indicates that the Georgian notation departed from the ancient Greek system, and developed into an independent system of notation at the beginning of our era.

The new element in the Georgian system of notation lay in the application of the purely octaval principle, which facilitated a more accurate expression of musical notes, and made it possible to reduce the clumsy Greek system of 23 basic signs to a system of eight characters.

Further, the antique notation had letter-like signs, which made it possible to take down the text of music for the purpose of study, but was ill adapted for reading at sight. The Georgian system made up for this shortcoming in the ancient Greek system, whose letter-like characters were replaced by simpler signs, which rise and fall, their outlines facilitating visual perception of the flow of the voice. Just as in the modern staves, a definite system of characters helps us to visualise the rise and fall in the vocal pitch, whereas the ancient Greek notation had all the characters linearly located above the text. This was a signal achievement. Ancient Georgian church music, holds pride of place with the most ancient musical cultures of the world.

Dr. PAVLE INGOROKVA *of the Institute of Ancient Manuscripts, Georgian Academy of Sciences, is an outstanding Soviet authority on Georgian literature and linguistics and has deciphered Hittite inscriptions on Georgian archæological finds.*

THE TREASURY OF ASIAN STORY-

ASIA is the home of the short story. Hundreds, and in some cases thousands, of years before Maupassant and Chekhov, tales that were short stories in the modern sense of the term were not only being told in the market places but were being put into writing in ancient Egypt, in other countries which today speak Arabic, in Israel, in China, and in Japan. The riches of the classical short story of the Far East are still, for the most part, unknown in the West...

Although in certain great Asian cultures, and in particular India and Persia, story-telling was first developed in other genres: in the epic poem, the fable and the drama, if we consider Asia as a whole, we may well say that since ancient times the short story form has never died...

Dozens of stories in the Bible, the Apocrypha and the Arabian Nights, when translated into living English, are revealed as gems of the story-teller's art...

In China in particular there has been a continuous two-thousand-year development from the anecdotes, fables, myths, and legends of earliest antiquity to the accomplished stories of the twentieth century.

That the art of the Asian story-teller is still a fruitful and powerful one is amply evident from contemporary writing. In many Asian lands the short story is now the form of literary expression, yielding only to poetry in others. There has obviously been much influence on contemporary writers by the European and American masters of the genre, but the influence of local tradition is equally strong.

A Treasury of Modern Asian Stories (edited by D.L. Milton and W. Clifford, Mentorbooks, New American Library, New York), from the foreword of which the above is extracted gives convincing evidence of the story-telling riches of the Asian continent in its thirty tales selected from the literatures of twelve countries and sixteen different languages. As the editors of the **Treasury** point out, they had thousands of pages of stories, an enormous wealth of material, to choose from. "It is high time", they say, "that the world got to know of the riches of Asian short-story writing, high time indeed that not one but a number of anthologies were published, at least one for each country and one for each literature."

This, in a work published simultaneously in England, the United States and Japan, Unesco has now done for the Japanese short story. **Modern Japanese Stories** * published as part of the Unesco Collection of Representative Works, is the fruit of several years of co-operative activities by the Literary Advisory Board of the Japanese National Commission for Unesco, the editor, Dr. Ivan Morris, Professor of Japanese history and literature at Columbia University, New York, and his team of fine translators.

Before the work of translating was begun, the Japanese National Commission for Unesco consulted a Board consisting of the greatest men of letters of contemporary Japan, and they, together with the editor, finally narrowed down the choice to one representative story of twenty-five important writers. The result is a thorough introduction to Japanese fiction in this century, and, in a sense, a picture of the contemporary Japanese mind.

MODERN JAPANESE FICTION

A break with tradition

by Ivan Morris

THE present literary scene in Japan is one of immense activity. Publishers and literary magazines abound, and the number of novels and stories published every year is overwhelming. With books extremely cheap—an average novel costs the equivalent of 6s. ($1.00) and of 1s. 6d. (25 cents) in a paper-backed edition—and the reading public large and alert, sales are vastly in excess of those before the war; the material rewards for literary success are considerable. Some of the most substantial incomes in Japan are at present earned by popular writers.

This situation is not without its dangers—dangers almost as great as those that beset the economically hard-pressed writers before the war. There is a considerable risk that "pure literature" (as it is rather primly termed in Japan) will still further lose audiences to commercial literature and to the so-called "middle novels," which occupy a place somewhere between the artistic and the popular.

In order to earn money many of the best writers produce serial novels for newspapers and magazines of large circulation. Sometimes an author will be working on two or more serial novels at the same time, as well as turning out articles on assorted subjects from birth control to Japanese-American relations, giving lecture tours and dashing off occasional stories to satisfy the requests of the numerous literary and semi-literary magazines.

One popular novelist recently became so confused by the number of different things he was writing simultaneously that he inadvertently changed the name of the main character in the middle of one of his serial novels—an error that was not caught up in proof and which caused considerable bewilderment to his readers.

For the successful Japanese writer it never rains, it pours. To remain successful he cannot afford to be long out of the public eye, and the artistic energy necessary to produce serious work is often dissipated by commercial demands. Such conditions are, of course, not limited to Japan, but the lack of solid tradition in modern Japanese literature adds to the danger. Fortunately the risk of total commercialization is recognized and deliberately resisted by a number of the better authors.

The *shi-shosetsu* tradition of semi-autobiographical "fiction" has survived into the post-war period, but it is no longer as widely followed as some decades ago. Most contemporary writers seem to be aware of the need for a wider approach than is usually manifested in the "I-novel" and the "I-story." Nevertheless, the confessional, diary type of writing, in which everything is seen through the eyes of one lone, sensitive individual, continues to be far more popular in Japan than in the West.

After 1945 the torrent of translations from foreign languages, which naturally subsided during the war, reached new heights. Novels, plays, short stories and poems from almost every country in the world were translated and published for a public whose appetite had been whetted by the years of official zenophobia and isolation. The choice of books for translation was often indiscriminate, sometimes incomprehensible. Nevertheless in the influx a large mass of worthwhile literature from the outside world has been made available.

To what extent, then, is current Japanese literature influenced by that of the West? In the first place, it should be emphasized that on the whole the influence is not nearly as direct as is often assumed by Western readers. Japan has now had some seventy years in which to absorb the literary traditions of the West. European and American literature have come to be taken for

Y-TELLING

Among the twenty-five authors represented are some who are already fairly well-known outside of Japan, for example Tanizaki, Kawabata, and Mishima, each of whom have had novels translated by Unesco, and Akutagawa and Kikuchi, both of whom have had famous films, such as **Rashomon** and **The Gates of Hell,** based on their work. The reader will also find stories of exceptional power and originality by men equally deserving of world-wide recognition, as Mori, Shiga, Muro, Niwa, Sakaguchi, Inoué and Dazai.

The book also contains a long critical "Introduction to Japanese Literature" (from which the article below has been taken), brief biographies of each of the twenty-five authors, and a selective bibliography of modern Japanese literature translated into English. The whole forms a most attractive and helpful guide to modern Japanese writing.

* *Published by Eyre and Spottiswoode, London ; Charles Tuttle, Tokyo, and Rutland, Vermont, U.S.A.* (*Price* 30/-, $6.50.)

BOOKSHOP BUSTLE in Tokyo reflects the immense activity of the present literary scene in Japan where publishers and literary magazines abound, books are cheap and the reading public large and alert. Swarming book-buyers here are crowding into a used book fair on the Kanda, Tokyo's famous bookshop section.

© The Japan Times Weekly, Tokyo

granted, and works from the outside no longer carry the aura of the exotic and the startling that they had in the early days of importation. Even more important, Japanese writers now have their own great literary figures —Natsumé Soseki, Mori Ogai, among others (1). They can now look back with a sense of belonging to an indigenous, if recent, tradition.

Although in many ways the Pacific War and its aftermath constituted a break with the past as great or even greater than that provided by the Meiji Restoration (1867-1910) there was no rupture with native literary tradition such as occurred in the 19th century. Whereas the new Meiji writers tended to look entirely to the West for their models, the writers of the present day receive their influence both from the West and from their own writers of the past sixty years.

Even in the early days of importation, literary influence in Japan rarely produced slavish imitation of certain specific European or American models. It was usually a much more indirect and complex process. As the young post-war writer. Mr. Mishima Yukio, has pointed out, Japanese novelists have usually assimilated only those elements of foreign literature that are in some way close to the recipient. This is more than ever true today when the Japanese writer has such an immense selection of world literature at his disposal.

Although the most conspicuous influences have certainly come from Europe, it would be a mistake to discount the effect of Chinese and Japanese classical literature on certain modern writers. This classical influence is reflected in the imagery, the descriptions, the general mood and sometimes the structural techniques of many outstanding post-Meiji writers and their successors. One of the most interesting aspects of writers like Nagai Kafu, Tanizaki Junichiro and Kawabata Yasunari is precisely the way in which they succeeded in moulding classical traditions with modern Western thoughts and technique.

However, the fact remains that the modern Japanese novel and story are essentially Western forms; in so far as literary influence has played a part, most Japanese prose writers are indebted to modern Western literature far more than to their own country's classical tradition. It is writers like Hugo, Poe, Whitman, Baudelaire, Dostoievsky, Tolstoy, Hardy, Zola, Huysmans, Maupassant, Wilde and D. H. Lawrence that have exercised influence rather than Murasaki Shikibu, Saikaku, Bakin, and the other famous prose writers of earlier centuries.

The remark made in 1910 by Natsumé Soseki, one of the most important of the post-Meiji novelists, could well be uttered by the vast majority of modern Japanese prose writers: "What governs my mind at this moment, what will influence all my future work, is not, alas, the tradition of my ancestors, but, rather, thoughts brought over from across the sea, and by an alien race."

But few post-war writers in making this statement would be inclined to include Soseki's expression of regret.

Japan is, of course, not the only country in which imported literature has exerted an influence, but the historical conditions of the Meiji Period made this influence of primary importance. As Mr. Mishima (who among the younger writers is particularly conscious of his own country's classical heritage) has said, "In most other countries there exists a strong literary tradition into which writers can assimilate whatever is imported. In Japan our literature does not rest on any such tradition. Although our talented writers have managed to utilize their abilities individually, there are very few of them who

(1) *All names are given in the normal Japanese order, with the family name preceding the personal one.*

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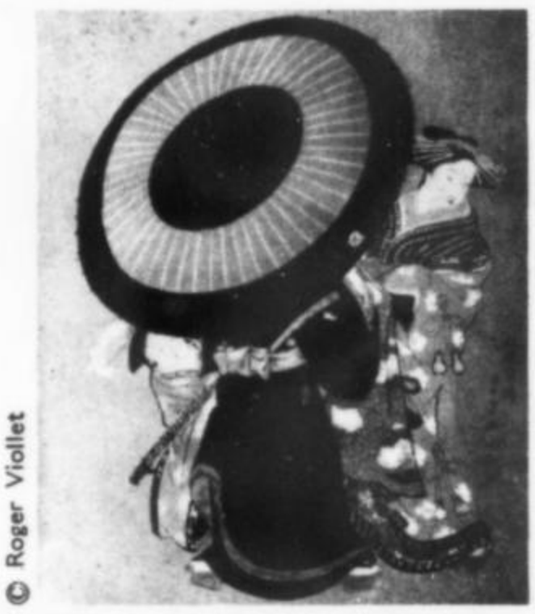


© Roger Viollet

A CENTURY OF CHANGE IN WRITING. After 1868 Japan's efforts to become "modern" led to a sharp break with a past epitomized by the traditionally garbed figures depicted above in this painting by the 19th-century artist Kyoden. The main effect of Western influence was to encourage Japanese writers to describe more realistically the brave new world they saw growing about them. Realism gave way to naturalism and, after the First World War, to a school of writing whose chief concern was the social condition of city workers, seamen and farm workers (right). Students (opposite) in a Tokyo bookshop reflect today's book boom, with sales vastly exceeding pre-war figures and large material rewards crowning literary success.

Maupassant : a bombshell in Japanese letters

have managed to ground their works on secure tradition."

In Japan, as in most other countries, the story or tale has an extremely long and varied history. Among the earliest collections that have come down to us (leaving aside ancient mythological collections where the literary motive is secondary) are those from the Heian Period (794-1185 A.D.) in which brief prose passages serve to provide the background for thirty-one syllable classical poems or to link a series of such poems by means of rudimentary plots.

The Tales of Isé from the ninth century is the best-known example; *The Tales of Yamato* (tenth century) belongs to the same tradition; *The Tales of Tsutsumi Chunagon* (which includes the charming and original fragment "The Lady Who Loved Insects") is a collection of ten stories with well-defined plots and considerable realism.

In the eleventh century *Tales of Past and Present,* consisting of over 1,000 stories taken from Indian, Chinese and Japanese history and folklore, represents a considerable advance in construction over the lyrical tales of the early Heian Period. Otogi-Zoshi is the generic term for collections of popular stories, most simply fairy-tales, that were in circulation during the Muromachi Period (c. 1300-1600).

In a more recent period the numerous collections of stories by Ihara Saikaku (1642-93) deal in a more or less realistic way with the lives of contemporary men and women, mostly members of the seventeenth century townsman class. *Tales of the Moonlight and the Rain* (1776), a famous collection of nine ghost stories by Ueda Akinari, belongs to a tradition of supernatural tales that goes back to the eighth century (2).

We should also take note of a common form that is to be found in much of Saikaku's work and elsewhere. This consists of a collection of stories having a common thread or theme; a typical example is Saikaku's *Reckonings That Carry Men Through The World* (Seken Munesanyo, 1693), which is a volume of twenty independent stories all dealing with the torments that different groups of characters experience on the last day of the year when all debts become due for payment.

Despite this ancient and diverse tradition, the modern Japanese story form in this century owed remarkably little to the various pre-Meiji collections of which examples have been given above. It is true that a number of the Meiji Period writers (including Higuchi Ichiyo, Ozaki Koyo, Koda Rohan and Tayama Katai) recognized in Saikaku's stories the same vigorous realism that they had found in modern French literature.

Saikaku's realism, however, served to confirm such writers in their already established literary approach, rather than to inspire them. When it actually came to writing stories, the main influences derived, not from Saikaku or the other pre-Meiji masters of realistic fiction, but from the recent literature of Europe and America.

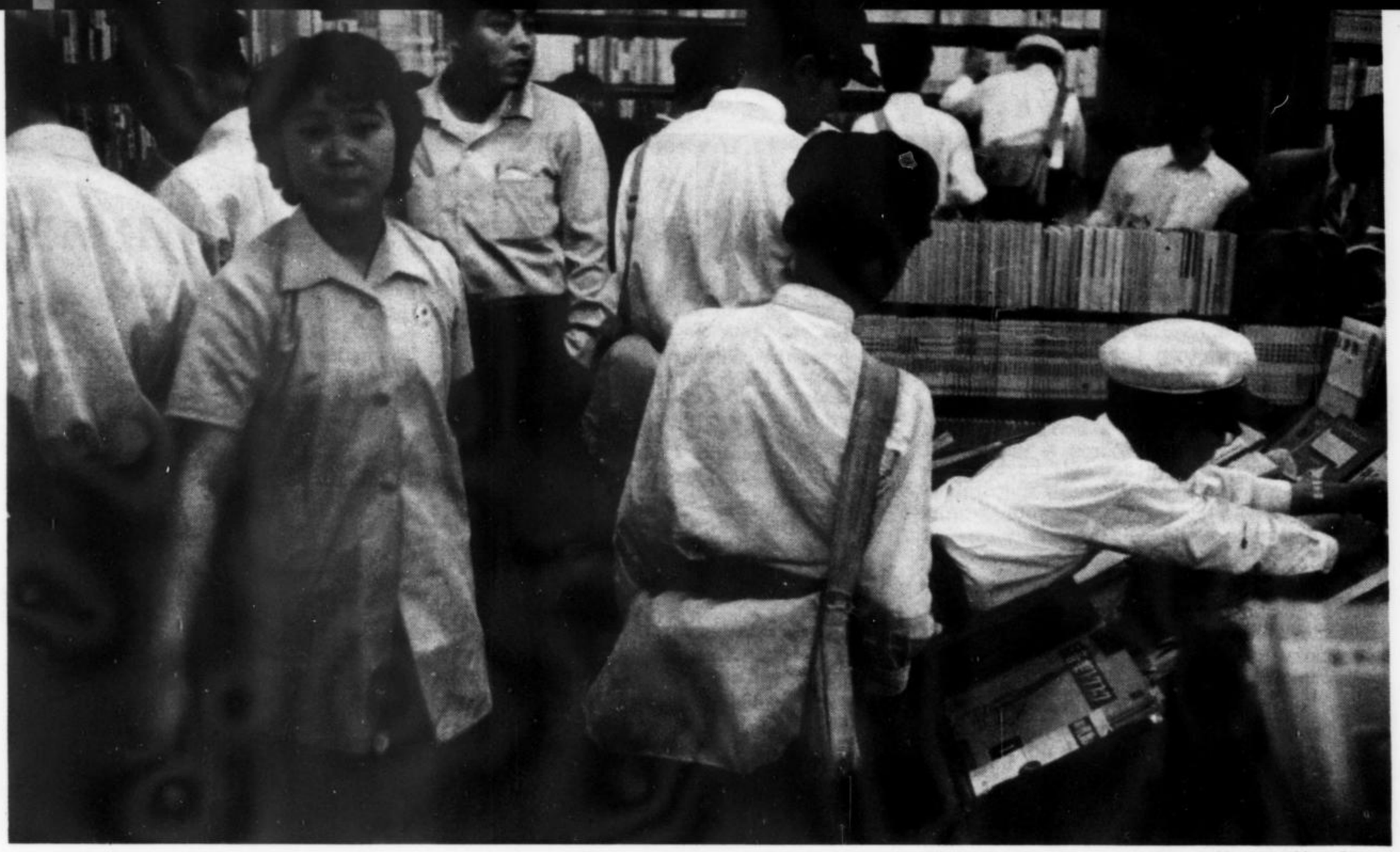
The history of the modern story in Japan can be considered to date from the introduction of Maupassant's work in the 1890's. One of the earliest writers to attempt to produce in Japanese the type of story that was current in Europe was Mori Ogai, who after his return from Germany in 1888 did so much to familiarize Japanese readers with Western literary forms.

Of the two masters of the late nineteenth century short story in Europe, Maupassant exerted considerably greater influence in Japan than Chekhov. The reason is not far to seek: the introduction of Maupassant's short stories coincided with the rise of Naturalism in Japanese literature and, indeed, was one of the important influences in this movement. It was Maupassant's direct, realistic and often harsh approach to his material that affected Japanese writers, rather than his mastery of the short story form itself.

Although Maupassant, like Chekhov, regarded the short story as being a *genre* in itself and although he contributed so greatly to giving it the characteristic form with which we are now familiar, his early influence in Japan did not on the whole lead writers to make the clear differentiation between the novel and the short story that is accepted in the West.

The line of demarcation in Japan between the two *genres* has always tended to be vague. This is reflected in the terminology. Both forms are known as *shosetsu,* the word for short story being differentiated only by the prefix *tampen* (short piece). *Shosetsu* is also used with

(2) *The English translation is to be published by the Cambridge University Press in the Unesco Collection of Representative Works—Japanese series.*



Photos Unesco - Marc Riboud

the prefix *chuhen*, (middle piece) to describe an intermediate length of work having about, 40,000 to 60,000 words; this roughly corresponds to what is sometimes known as novelette, but the form is very much more popular in Japan than in the West.

Thus there is a regular continuum from *tampen-shosetsu* through *chuhen-shosetsu* to *shosetsu*. The only real differentiation is in the matter of length, which itself tends to be very indefinite. This is not simply a matter of terminology, but extends to the conception—or rather, lack of conception—of the short story as a distinct literary form. Very frequently we find the same piece of fiction being described alternatively as a novel and as a short story.

One result of this vague differentiation is the absence from so many Japanese stories of certain stylistic qualities that we have come to regard as essential to the modern short story in the West. This is certainly not to suggest that the story is a narrow form with certain strictly defined rules or cannons. Far from it. A *genre* that so greatly antedates the novel is bound to have enormous flexibility.

THE history of the story in the West goes back to the *Tales of the Magicians* (from the Egypt of almost 4,000 years ago) and traces its complex descent through Aesop, Boccaccio, Chaucer, the Bible and La Fontaine, to name only a few of the great landmarks. Any neat definition is both impossible and undesirable.

As the well-known short-story writer, Kay Boyle, has said, "The only continuity it (the story) possesses is that it was isolated individuals, sometimes writing centuries apart, who spoke with freshness and vigour, in a short-winded rather than a long-winded form, of people, and ideas, and incidents, which seemed to the reader moving and true."

Since the time of Gogol, however, the story has developed in a certain manner that we may characterize as the "style of the modern Western short story." Its outstanding feature is an economy of means. This has involved a tendency to compression, to the dropping of inessentials. The tendency has continued until the present day and has been given particular impetus by the short stories of Ernest Hemingway, whom Mr. H.E. Bates describes as the "man with an axe... (who) cut out a whole forest of verbosity" (H. E. Bates: "The Modern Short Story".)

Without economy there can be no short story in the modern sense of the term. This, of course, does not preclude the existence of short stories of considerable length. The tendency since the time of Tolstoy has certainly been in the direction of brevity, but the modern story may vary from a few hundred words to 15,000 or even 20,000. What is essential is the close construction, the casting of all the material round a single central image and the overall compression that have become the marks of the successful modern short story in the West.

By these general standards a considerable proportion of *tampen-shosetsu* are not short stories at all; frequently they appear to be sketches, essays or truncated novels. A large number of Japanese story writers are primarily novelists for whom stories tend to be what Miss Elizabeth Bowen has called "side-issues from the crowded imagination."

Since the novel and the modern short story are two totally different *genres* it is most unlikely that a writer will be equally at home in both, and this applies in Japan quite as much as in the West. The plethora of literary magazines in Japan has encouraged many writers to produce stories when their style was better suited to the novel. As a result, their work often lacks the stylistic compression that is the essence of the modern short story.

This is not primarily a matter of word-length (though it is worth noting that Japanese stories are as a rule far longer than their modern Western counterparts,) but of failure to apply the indirect, suggestive and dramatic methods which are indispensable for economy of style. In a country that has produced the most compressed forms of poetry in world literature, it is remarkable that stories should so frequently be marked by a turgid verbosity which cries out for the ministration of a red pencil.

Fortunately a number of good modern writers in Japan have treated the short story as an equal and separate *genre* of literature, not merely as an abbreviated novel or as a sketch. Of the authors represented in *Modern Japanese Stories*, the three who stand out in Japanese letters as short-story writers are Shiga Naoya, Akutagawa Ryunosuké and Nakajima Ton.

The fact that these three writers are all masters of literary style is not irrelevent. Like the poem, the short story is undoubtedly a type of writing in which style or form is all-important. An indifferently written or poorly constructed novel may impose by the ingenuity of its plot, by the evocation of some unusual scene or atmosphere or again by the vivid portrayal of a character; but a badly written short story is almost bound to fail, regardless of its content.

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Letters to the Editor

SPACE TRAVEL & CONTAMINATION

Sir,

Today when we not only have a window but also a door towards space, there are two related problems your worthy publication could help us with.

Can space vehicles be *entirely* sterilized so that not a single microbe escapes to contaminate possible discoveries? Are they? Would not researchers themselves carry contaminating microbes on their explorations?

In reverse, what are the chances of bringing to earth dormant microbes to which man has developed no resistance through cohabitation of the planet, and which, if given the proper conditions on earth, would rapidly devastate us?

These can no longer be considered science fiction problems. THE UNESCO COURIER alone can deal with these topics with the authority of the world scientific organization. I have much appreciated the treatment you accorded to other matters of world concern.

George R. Schäfer
Montreal, Canada

ED. NOTE: *A special issue on the Conquest of Outer Space is in preparation.*

FREEDOM FROM FEAR

Sir,

The mass of the world's people are now tortured by fear as they never were before. This fear psychology has built itself into a widespread neurosis in which the fear of nuclear war, with the apprehension and dread of the inconceivable horror of its aftermath, has resulted in deeply disturbing feelings of frustration, insecurity, hatred and suspicion, and these feelings are the direct cause of a resurgence of war hysteria, race hatred, juvenile delinquency and crime and general discord and disregard of human rights.

To survive, it is up to us to replace our much-used negative emotions of fear, hatred, suspicion and deceit, with our slightly used endowments of reason and judgment, tolerance and understanding, together with the will to get along together and to sincerely extend compassion and goodwill to all our fellowmen. These are the only ways left us sanely to settle international disputes, and we had better start to use them right now.

Rufus J. Bean
Pabellon, Mexico

ARGENTINA SALUTES TAGORE

Sir,

We were surprised to see in the December, 1961 issue of THE UNESCO COURIER, dedicated to Rabindranath Tagore, that no mention was made of the homage paid to his memory in Argentina by the Commission formed in this country to celebrate the centenary of his birth. We enclose a list of tributes paid to Tagore.

Victoria Ocampo
President, Executive Commitee,
Argentine Commission of Homage
to Tagore on the Centenary of
his Birth

ED. NOTE: *This information not having been communicated to* Unesco *earlier,* The Unesco Courier *could not include it in its Tagore issue. We are glad to do so now. Argentina's centenary celebrations included the presentation of Tagore's play "The King's Postman" at the Teatro Nacional de Comedia; a series of eight lectures at the National Museum of Decorative Arts, where reproductions of Tagore's paintings and original manuscripts were displayed; the publication of* Tagore's Birthday Book *and of* 13 *poems from* Puravi; *a special issue of the literary magazine,* Sur, *devoted to Tagore; the publication of a book,* Tagore on the Slopes of San Isidro, *by Victoria Ocampo; the issue of a record with poems from* Gitanjali, *recited in English, French and Spanish, the naming of a street in San Isidro and the issue of a stamp bearing his portrait.*

SAVE EGYPT'S MONUMENTS

Sir,

I feel that Egypt is my true home and I can almost believe that I lived there 2,000 or 3,000 years ago. So I would hate to see the treasures, temples and palaces of Egypt destroyed by the waters of the Aswan Dam. I am only thirteen years old and so too young to do anything about it. But as someone who loves that beautiful country, I ask you to speak out against the construction of the dam.

Jacqueline Lagrandie
Sarlat, France

ED. NOTE: *Why disagree with the building of a dam which is so badly needed in Egypt? It is far better to object to the destruction of the temples of Abu Simbel and to do everything possible to save them.*

MULTILINGUAL PROBLEMS

Sir,

I refer to the letter from Mr. John C. de V. Roberts which you published in your February issue. As an editor of other publications I know only too well your difficulties in producing the same publication in several languages. An article written in one language, when translated and made to fit a pre-arranged space, might sometimes give the impression of padding.

Only this month I had an article written for me by a well-known French journalist on a French subject. The original manuscript was, in my opinion, brilliant, but I had to use it in English. Although the subject matter is interesting, the author's individual style has been lost and I am less satisfied with the result.

Regarding the suggestion that you need better authors, a perusal of one or two back numbers chosen at random produces such names as Ritchie Calder, Madame Desroches-Noblecourt, L.P. Kirwan, Sir Julian Huxley, A.W.F. Banfield, André Maurois, Enrique Lafuente Ferrari. All these are acknowledged experts in their own fields and any editor would be proud to put them amongst his contributors. In my opinion, you do an extremely difficult job exceptionally well.

Reg Holmes
London, England

WOMEN IN PURDAH

Sir,

After reading your article, "Moslem Women" (March 1961) I feel obliged to make a few corrections concerning Pakistan. I returned to France in 1961, after spending three years in Pakistan including two and a half at Multan, the third largest city in western Pakistan, and my memories and impressions of Pakistani women are still very fresh.

I do not agree with Mrs. Anne-Marie Hussein. What she says is partly true no doubt of Karachi, Lahore, Rawalpindi and Peshawar, where half the women one meets are unveiled. As for the rest of the country, and especially Multan, I don't think I have seen more than ten women out of purdah during the whole of my stay. And there is little hope of improvement. On the contrary.

Wives of doctors or railway engineers and women teachers in girls' schools, who do not wear the veil in Karachi or Lahore, are obliged to do so here or they would be insulted and even molested in the street. Schoolgirls go to college in purdah. It is a strange sight.

J. Theureau
Annecy, France

JUNIOR UNESCO COURIER

Sir,

While I have an unbounded admiration for UNESCO, I do not care so much for THE UNESCO COURIER and have decided to discontinue my subscription. I am a schoolmaster in charge of the school library where we have included the Courier for the past year, among our other periodicals; but I have decided to stop our subscription. My experience is that it is little read and this, I think, is due to its unattractive lay-out. The photographs are not too clear, the print is uninteresting in appearance, and the subject-matter does not beckon the child to read it. Nevertheless, I do not apply these criticisms on behalf of adults, for whom the COURIER is a valuable periodical.

Have you thought of producing a JUNIOR COURIER?

E. H. Warne
Upminster, England

ED. NOTE: *A Junior Unesco Courier has been the subject of discussion by both the Secretariat of Unesco and the General Conference. This is a highly complex problem which is still being studied.*

REMINISCENCES BY A FRIEND OF TAGORE

Sir,

Returning from a lecture tour on Tagore in Finland, Norway and Sweden, I saw your number (December, 1961) with pictures and articles on my "Gurudev" which put me in a reminiscent mood. Perhaps you will allow a pupil, who was the tenth to join the Poet's experimental school in 1901, to relate some of his memories.

Ours was a real, closely-knit family over which hovered the benign presence of the Master. He was a born teacher, and took our classes in Bengali and English, wrote elementary text books for us to learn Sanskrit and English, and read to us Shelley, Keats, Wordsworth and Browning, and Matthew Arnold's essays on English Literature. In the evenings he would regularly join in our "entertainment" hour, devising new games for us, one of which was called "Sense-training" i.e. we had to guess from a quick look the length of a table, shelf, door, etc. I remember the Poet was very keen on this "Sense-training".

Just as here in Paul Geheeb's school, the children close their books and are off skiing on a particularly fine winter morning, so at Santiniketan too the children welcomed the rains by rushing out to get drenched to the skin, and even the Master joined us occasionally. We of course had our classes in science, carpentry, gardening and Ju-jitsu (a teacher was brought all the way from Japan). I have often heard the Poet nostalgically speak of those early days, when the school was unknown to the outside world and he was free to experiment and learn by mistakes—so unlike today, when many tourists have Santiniketan in their itinerary along with the Taj Mahal and Delhi's Red Fort.

Coming from Santiniketan, I was naturally interested in progressive schools, and so visited the Odenwaldschule of Paul Geheeb in 1927. I was so impressed by all I saw and it reminded me so much of my own Santiniketan days, that I gave the Poet no rest till in 1930 he visited Paul Geheeb (See THE UNESCO COURIER, Dec. 1961, p. 9) whom he greeted on his sixtieth birthday "as my spiritual comrade and friend of Man". This is perhaps the only good deed I have done in my life, in bringing these two pioneers and revolutionaries in the field of education from East and West together.

In the earlier twenties, after finishing Cambridge, I was a student of Professors Planck and Einstein in Berlin. The Swiss Science Congress met in Lucerne in 1925 and I had the opportunity to speak a lot about my "Gurudev" to Einstein, especially about his lectures in Japan and America during the First World War, in which he condemned narrow, aggressive Nationalism and preached a larger Humanism that embraced East and West in bonds of fellowship. These were in harmony with the thoughts of the great humanist Einstein himself, and he was very happy to read the book "Nationalism" which I gave him soon after my return to Berlin. This was his very first acquaintance with Tagore's writings.

★

In 1926 when Tagore came to Berlin, they met in Einstein's flat for tea and I acted as interpreter, as Einstein's English was at the time not too perfect. I remember that the social implications of the extended use of machinery in displacing men from industry and agriculture, and thus increasing unemployment (in Germany the rising figures of unemployment was just then helping Hitler's mass-movement) was troubling the sensitive conscience of our great Western sage and on this point he put several questions to our Poet.

I took Tagore in a taxi to Epstein's studio in London, for him to see his works. I remember that the robust bust of Conrad—a veritable sea-dog—made a great impression on our Poet and he consented to sit for Epstein. I used to sit in a corner watching Epstein work. I liked the bust very much at the end of the third sitting. But he worked for two days more and, at least I felt, spoilt it. He did not, I feel, succeed in capturing Tagore's beautiful and expressive eyes.

Tagore was really like a child and had to be taken about by his secretaries, and he never carried a penny in his pocket. In Munich station I saw him get down from the train in June 1921—like a cherub fallen from heaven—his secretary with his luggage in the second half of the train cut off for some unknown reason. Of course he had not a penny with him and was boisterously enjoying the funny situation. It was here in Munich that the Sanskrit professor, after Tagore's lecture in the University, announced that the Poet had donated the whole of the proceeds from the sale of his works in German to feed starving students.

I could write much more but must end with just one more memorable recollection. It was June 1921 in Tagore's hotel in Berlin. His visitor was Prof. Rudolf Otto of Marburg, whose famous book *Das Heilige* has been translated into many languages.

They spoke for over an hour on how to build up a new world from the ruins of a devastating war, and suddenly Tagore exclaimed with fervour: "Your country and mine, both are disarmed. Let us unite our efforts and with the might of the spirit bring healing to this world!" Alas for the Poet's dream! In a few years Hitlerism engulfed Germany, presaging the outbreak of World War II. In these days to be a cynic is so easy! But let us remember Tagore's very last words:

"I shall not commit the grevious sin of losing faith in Man.

"I shall wait for the day when the holocaust will end and the air will be rendered clean with the spirit of service and sacrifice."

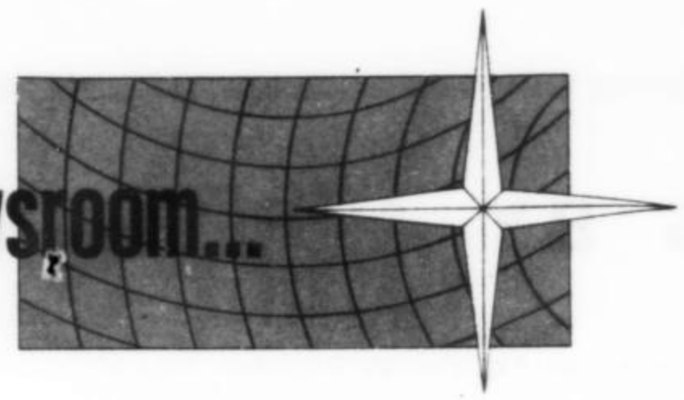
THE UNESCO COURIER has done a service for the cause of Peace and Understanding in bringing out this Tagore number, for which please accept my sincere thanks.

Aurobindo M. Bose
Ecole d'Humanité
Goldern, Switzerland

THE UNESCO PHILATELIC SERVICE

ON September 20, 1960, fifteen newly-independent African countries became members of the United Nations. Some have since issued stamps to commemorate the first anniversary of their membership. Those shown here are from: Republic of Dahomey (right) issued in 5, 60 and 200 Fr. denominations; Republic of Malagasy (left) 25 and 85 Fr.; Republic of Niger (centre) 25 and 100 Fr. These stamps and other philatelic items can be obtained from the Unesco Philatelic service. As agent in France of the U.N. Postal Administration, Unesco's Philatelic Service stocks all U.N. stamps currently on sale. For prices and further details write The Unesco Philatelic Service, Place de Fontenoy, Paris-7e.

From the Unesco Newsroom...



INTERNATIONAL CO-OPERATION IN SPACE: The United States regards UNESCO as one of the Specialized Agencies of the United Nations best suited to further international scientific co-operation, and hopes it will collaborate with the World Meteorological Association in implementing a recent U.S. resolution in the United Nations on atmospheric science and technology. This was stated by Mr George V. Allen, Chairman of the U.S. National Commission for UNESCO, replying to a message of congratulations from UNESCO on the successful space flight made by the American astronaut, Colonel John Glenn. UNESCO's message read: "Please accept UNESCO's heartiest congratulations on great achievement of American science successfully completed."

■ **UNIVERSITY FOR BRASILIA:** Brazil's new capital. Brasilia, is to have its own university. Work is now going ahead based on plans on which the noted Brazilian architects Oscar Niemayer and Lucio Costa are collaborating with members of the new university's own Faculty of Architecture.

FELLOWSHIPS FOR AFRICANS: Nine young musicians from Africa will be studying in an academy of music in Great Britain next year. Hundreds of African student teachers will be taking courses in countries from Bulgaria to Mexico and from Sweden to Israel. In Rome a student from Somalia will be learning all about film production. These are a few samplings from a UNESCO's publication, "Fellowships for Africans" which list 10,000 opportunities for African students to study abroad. This 50-page booklet (printed in English and French) is available free of charge from the International Exchange Service, UNESCO, Place de Fontenoy, Paris 7e, France.

■ **EDUCATION FOR ASIA'S WOMEN:** Delegates from 16 Asian countries met recently in Bangkok at UNESCO's invitation to take stock of the educational, cultural, social and economic obstacles to adequate education for women in rural Asia today. The meeting studied problems at all levels from primary schools to adult education programmes, and recommended ways of improving facilities available to women.

PROBLEMS OF YOUTH TODAY: The problems facing youth in the modern world are being studied during a series of UNESCO-sponsored meetings by a working group composed of international non-governmental organizations and youth associations. The latest, held in Paris, dealt with difficulties faced by young people finishing school and setting out to earn their living. UNESCO's inquiry into youth's needs and problems is being made in 15 countries. It is estimated that young people in the 15-20 age group make up one-fifth of the world's population.

■ **ALL THE WORLD'S SOILS:** The Food and Agriculture Organization (FAO) and UNESCO are co-operating in a joint project to make the first soil map of the world which will show the major types of soil and thus provide a key to better land use. The work will take seven years and a first outline of the world map will be studied at the Congress of the International Society of Soil Science to be held in Rumania in 1964.

TRAINING CENTRE FOR ASIA'S EDUCATORS: India and UNESCO have signed an agreement for the setting up of a regional centre in New Delhi where Asia's educational planners, administrators and supervisors can be trained. This is one of four regional centres to be established this year under UNESCO's programme for the development of primary education in Asia.

■ **TWO NATIONS JOIN UNESCO:** Tanganyika joined UNESCO on March 7 and Sierra Leone on March 28, thus bringing the total of the Organization's member states to 105.

MORE TEACHERS NEEDED: Another 95,000 teachers will have to be recruited in England and Wales by 1970 if present educational requirements are to be met, according to a recent report entitled "Investment for National Survival" published by the National Union of Teachers. By 1970, the total teaching force in England and Wales for both state and private schools, a training college and colleges for further education will have to total at least 420,000.

■ **WOOD HARDER THAN IRON:** Two rare species of birch tree found in the Soviet Union apparently produce wood that is harder than iron. Known as the "Schmidt" birch and the Temiragach, or "iron birch", they have wood which is one and a half times as hard as cast iron, sinks in water and is used instead of metal for making gear wheels and other machine parts. When the "iron birch" is cut down it throws up new shoots within a few days. Soviet specialists are now trying to transplant these trees into other regions.

SOLAR-POWERED 'EARS': Units which are described as combination radio and public address systems have been sent to communities in Paraguay by the Administration for International Development, a U.S. government agency. Using a small slice of silicon to transform solar energy into electricity, they are expected to facilitate communications in Paraguay's villages. Similar devices are to be sent to India, Pakistan and Afghanistan.

■ **RADICAL CURE FOR MALARIA:** No one need die of malaria now that fully reliable means exist both for curing it and for preventing the infection from making further victims, says the World Health Organization. This was revealed by discussions during the Second European Conference on Malaria Eradication, held recently in Tangiers. The Conference noted that the radical cure of malaria was now possible thanks to modern drugs (the 8-amino quinolines, of which the most widely used is primaquine).

WORLD BANK AID FOR GHANA: An important boost was given to Ghana's economic development plans recently by the decision of the World Bank to make a $47 million loan to help finance the construction of a giant rockfill dam over the Volta River, 60 miles north of Accra. The project will provide power for a giant hydroelectric station and will create a reservoir stretching 200 miles northwards. It will enable new industries—rice growing, for example—to be started, and will generate electricity to work an aluminium smelting plant at the port of Tema, 44 miles away.

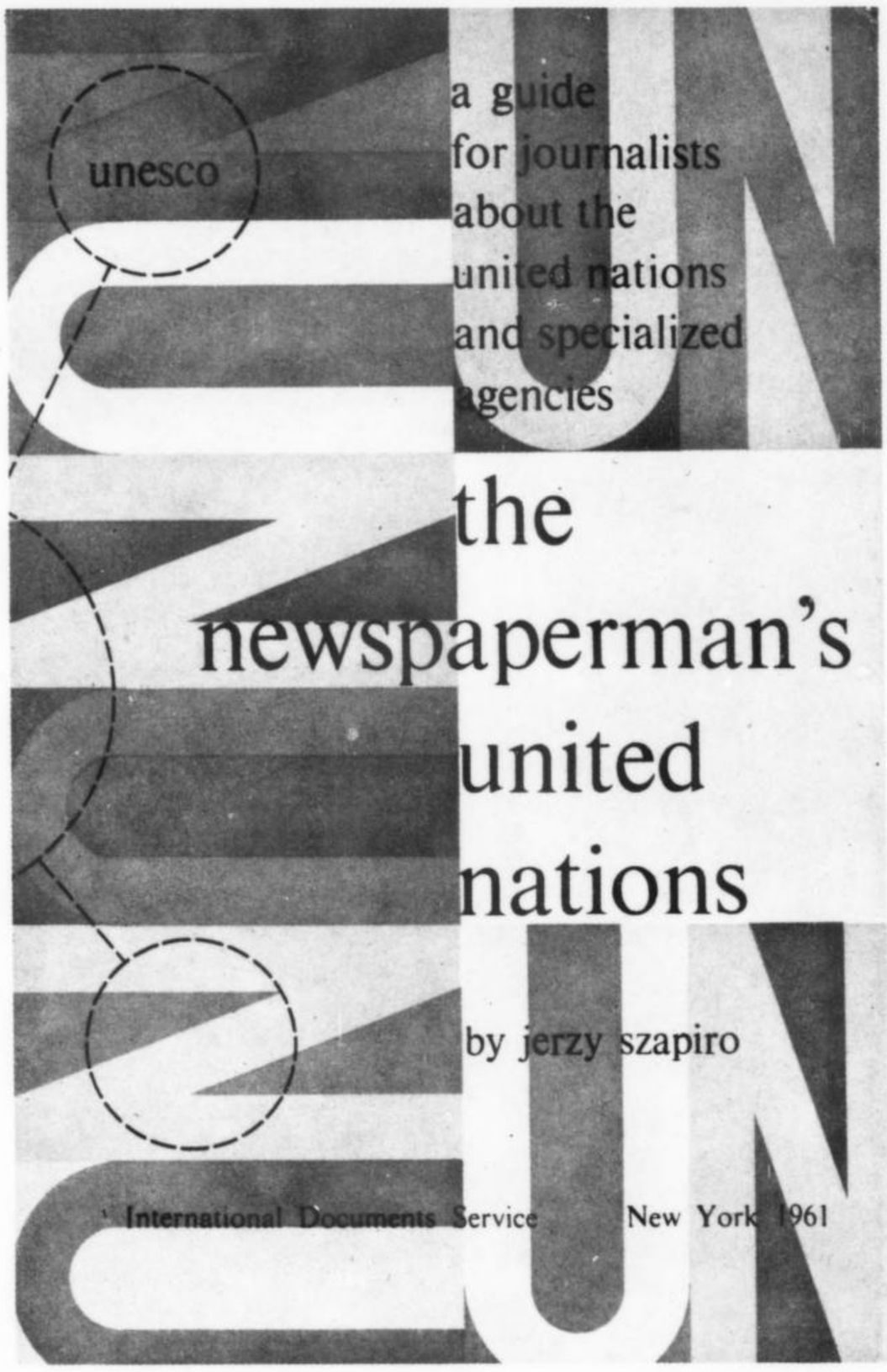
■ **EQUAL ACCESS TO SCHOOLS:** The United Kingdom recently became the fourth country—after the Central African Republic, France and Israel—to ratifiy the Convention Against Discrimination in Education, adopted in December 1960 by the UNESCO General Conference. The Convention which enters into force on May 22 defines descrimination as including any distinction "based on race, colour, sex, language, religion, political or other opinion, national or social origin, economic condition or birth."

GERMANY'S COMPUTOR SCHOOL: The first electronic computor school in the Federal Republic of Germany has been opened. Known as the Federal Technical School for Mechanical Manipulation of Data, it offers courses in the operation of machines used in factories, offices and public services, including such subjects as electronics and perforated card techniques, storage and classification of data.

■ **LATIN-AMERICAN EDUCATORS LOOK & LEARN:** Educators from 15 Latin American countries recently wound up a three-month European study tour in Paris where they visited schools and met education authorities. The tour, sponsored by UNESCO's International Exchange Service, enabled 43 specialists to make first-hand studies of educational planning programmes in Spain, Italy, Switzerland and France. It was part of UNESCO's Major Project for the extension of primary education in Latin America.

EYE ON THE SKY: Soviet astronomers, now have a new and extremely powerful telescope for astronomic observations, which has been installed at the Astrophysics Observatory of the Crimea. Reported to be the largest telescope in Europe, the apparatus has a mirror weighing 4 tons and 2.6 meters in diameter, which was fused at a Leningrad optical works factory. The rotating lens can be synchronized with star movements by means of one of the telescope's 160 automatic electronic systems.

Imp. GEORGES LANG, PARIS. IMPRIMÉ EN FRANCE.



A GUIDE TO THE UNITED NATIONS

A compact reference book on all aspects of the United Nations and its many associated bodies has just been published by Unesco. Tracing the ideas behind the creation of the United Nations, its birth in San Francisco and its early history, this book shows clearly how the United Nations work has evolved and been divided into different branches. There are, for example, the political questions, economic and social problems, humanitarian and social work, technical assistance, the trusteeship system for non-self-governing territories and the legal work of the U.N. Called "The Newspaperman's United Nations", this 230-page volume is all that it claims to be—a guide for journalists about the United Nations and the specialized agencies—and more: it is the kind of book that those so inclined can pick up and browse through for a few minutes or an hour's informative and profitable reading. In addition to producing a readable vademecum for all who are interested in the U.N., the author has compiled a first-class bibliography.

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by Jerzy Szapiro.
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MODERN JAPANESE FICTION

—A break with tradition *(See page 28)*

Shrike on Dead Tree, by Miyamoto Musashi (17th century) Nago Museum, Kanagawa.

Priest, by Ka-o (14th century) Nago Museum, Kanagawa.

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